University of Alberta Library
0 1620 3410250 7

MATHEMATICS 7

LEARNING FACILITATOR'S MANUAL

Distance Learning

Alberta EDUCATION

Modules 1–7

Mathematics 7

LEARNING FACILITATOR'S MANUAL

Alberta
EDUCATION

NOTE: This Mathematics 7 Learning Facilitator's Manual contains the Final Test and answers to the Final Test and to the teacher-assessed assignments; therefore, teachers should at all times keep it secure against unauthorized student access. The Final Test should be accessible to students only in supervised situations.

Mathematics 7
Learning Facilitator's Manual
Modules 1–7
Alberta Distance Learning Centre
ISBN 0-7741-1104-6

This document is intended for	
Students	
Teachers (Mathematics 7)	✓
Administrators	
Parents	
General Public	
Other	

You may find the following Internet sites useful: Alberta Education, http://ednet.edc.gov.ab.ca; Alberta Distance Learning Centre, http://ednet.edc.gov.ab.ca/level3/adlc/300/adlchome.html; Learning Resources Distributing Centre, http://www.lrdc.edc.gov.ab.ca.

The use of the Internet is optional. Exploring the electronic information superhighway can be educational and entertaining. However, be aware that these computer networks are not censored. Students may unintentionally or purposely find articles on the Internet that may be offensive or inappropriate. As well, the sources of information are not always cited and the content may not be accurate. Therefore, students may wish to confirm facts with a second source.

ALL RIGHTS RESERVED

Copyright © 1996, the Crown in Right of Alberta, as represented by the Minister of Education, Alberta Education, 11160 Jasper Avenue, Edmonton, Alberta T5K 0L2. All rights reserved. Additional copies may be obtained from the Learning Resources Distributing Centre.

No part of this courseware may be reproduced in any form, including photocopying (unless otherwise indicated), without the written permission of Alberta Education.

Every effort has been made both to provide proper acknowledgement of the original source and to comply with copyright law. If cases are identified where this effort has been unsuccessful, please notify Alberta Education so that appropriate corrective action can be taken.

IT IS STRICTLY PROHIBITED TO COPY ANY PART OF THESE MATERIALS UNDER THE TERMS OF A LICENCE FROM A COLLECTIVE OR A LICENSING BODY.

UNIVERSITY LIBRARY
UNIVERSITY OF ALBERTA

Teachers

Register with the Alberta Distance Learning Centre

The Alberta Distance Learning Centre is dedicated to upgrading and continually improving your Learning Facilitator's Manual so that it accurately reflects any necessary revisions we have had to make in the Student Module Booklets, Assignment Booklets, or the sample Final Test. The types of revisions that will be made are those that make the course more accurate, more current, or more effective.

ADLC will send you the **latest enhancements** or **minor upgrades** for your Learning Facilitator's Manual if you return the following registration card to: Alberta Distance Learning Centre, Box 4000, Barrhead, Alberta T7N 1P4, Attention: Instructional Design and Development.

ADLC Learning Facilitator's Manual
Registration Card

First Name	Surname
School Name	School Phone Number
School Address	
City	Postal Code
Course Title	Approximate Date of Purchase

You can help ensure that distance learning courseware is of top quality by letting us know of areas that need to be adjusted. Call the Alberta Distance Learning Centre, free of charge by using the RITE line, and ask for the Editing Unit. Also, a teacher questionnaire has been included at the back of most Learning Facilitator's Manuals. Please take a moment to fill it out.

We look forward to hearing from you!

Contents

Introduction 1

Overview of the Program of Studies 3

Overview of Mathematics 7 4

Structure of the Learning Package 5

Using This Learning Package in the Classroom 9

Evaluation 13

Introducing Students to the System 16

Module 1 18

Module 2 26

Module 3 32

Module 4 41

Module 5 51

Module 6 63

Module 7 72

Answer Key to the Final Test 83

Student's Copy of the Final Test

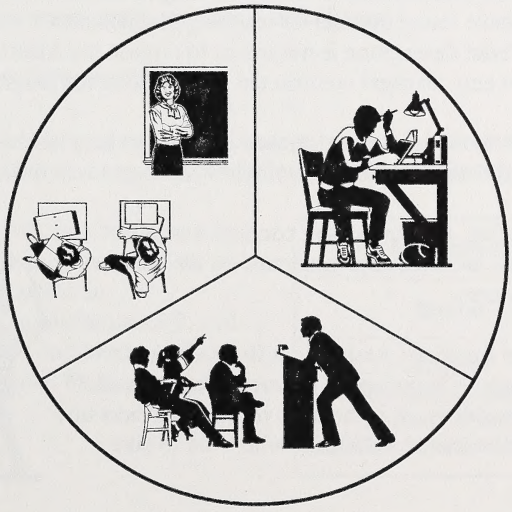
Teacher Questionnaire

Introduction

A survey of these course materials will confirm that this learning package has been specially designed for many kinds of teachers working in a variety of situations.

In Which Category Do You Fit?

- ❑ Small Schools Teacher
  - ❑ inexperienced
  - ❑ experienced, but in other subject areas
  - ❑ experienced in teaching Mathematics 7, but wanting to try a different approach
- ❑ Distance Learning Teacher
  - ❑ travelling to schools within the region
  - ❑ using facsimile and teleconferences to teach students within the region
- ❑ Large Schools Teacher
  - ❑ inexperienced
  - ❑ experienced in teaching Mathematics 7, but wanting to try a different approach



Because these materials have been created by experienced classroom teachers and distance learning specialists, they have many advantages for students and teachers, regardless of the situation.

Advantages for Students

Materials

- incorporate a strong learner-centred philosophy
- promote such qualities in the learner as autonomy, independence, and flexibility
- are developed through media that suit the needs and circumstances of the learner
- reflect the experiential background of Alberta students
- provide opportunities by overcoming barriers that result from geographical location
- promote individualized learning, allowing learners to work at their own pace

Advantages for Teachers

Materials

- allow teachers maximum teaching time and minimize preparation time
- include different routes through the materials to suit different learners
- incorporate a wide range of teaching strategies, in particular those using independent and individual learning
- deliver curriculum designed by education specialists that reflects the Alberta Education Program of Studies with an emphasis on Canadian content
- provide learning materials that are upwardly compatible with advanced educational technology

Does this learning package sound like something you could use?

This Learning Facilitator's Manual begins with an overview of the current Alberta Education Program of Studies for Mathematics 7. This summary is included for inexperienced teachers or those teachers who have found themselves teaching Mathematics 7 when their training is in other subject areas. This brief description is not meant to replace the Alberta Education Program of Studies, but rather to help teachers confirm the highlights of the program.

Other parts of this introduction have also been included to help teachers become familiar with this learning package and determine how they might want to use it in their classrooms.

Beyond the introduction, the guide itself contains answers, models, explanations, and other tips generated by the teachers who authored this course.

The Student Module Booklets, Assignment Booklets, and LFMs are the products of experienced classroom teachers and distance learning specialists. It is the hope of these teachers that their experience can be shared with those who want to take advantage of it.

Overview of the Program of Studies

The distance learning materials for Mathematics 7 reflect the beliefs, goals, and expected student outcomes of the document *Common Curriculum Framework for K–12 Mathematics: Western Canadian Protocol for Collaboration in Basic Education* (June 1995), which provides the basis for the programs of study in Alberta, British Columbia, Manitoba, Northwest Territories, Saskatchewan, and the Yukon. An overview of the Common Curriculum is provided here for your convenience; however, it is recommended that you obtain a copy of this document.

The Common Curriculum reaffirms the belief that students are active learners who have had varying experiences and who hold different views about mathematics and life. Students need to explore, reason, and communicate mathematical ideas, and construct their own meaning of mathematics. Students need numerous and varied experiences in order to appreciate the usefulness of mathematics and to view mathematics as an integrated whole. Moreover, it is important that learning activities proceed from the concrete to the abstract and from the simple to the complex.

The collaborating provinces and territories agree that mathematics education must prepare students to solve problems, communicate and reason mathematically, and appreciate and value mathematics. In order to function effectively in this technological age, students must become familiar with calculators and computers. It is important that students develop a positive attitude toward mathematics and have a base of knowledge and skills related to all aspects of mathematics.

The content of the Common Curriculum is stated in terms of outcomes. These outcomes are measurable and identify what the students are expected to know and do. The outcomes for the entire Kindergarten to Grade 12 framework are organized within four strands: Number, Patterns and Relations, Shape and Space, and Statistics and Probability. The student outcomes incorporate seven mathematical processes: communication, connections, estimation and mental math, technology, problem solving, reasoning, and visualization. The outcomes are also influenced by the nature of mathematics and such recurring themes as shape, dimension (size and scale), number, quantity, pattern, relationships, uncertainty, constancy, and change.

Suggested Time Allotments

Considerable time should be spent on the concepts and processes identified within each strand. The following chart outlines the suggested time allotments for mathematics in grades 5 to 9.

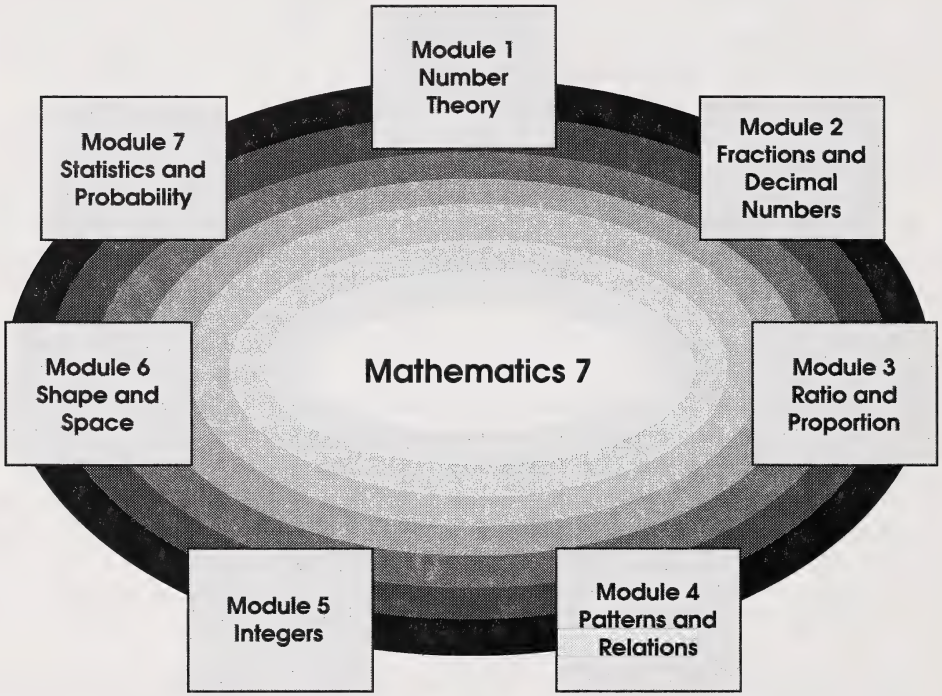
The time allotment will vary from grade to grade. For example, more time will be spent on the number strand in Mathematics 7 than in Mathematics 9, and less time will be spent on Shape and Space in Mathematics 7 than in Mathematics 8.

Mathematics in Grades 5 to 9	
Strand	**Time (%)**
Number	25–35
Patterns and Relations	20–30
Shape and Space	20–30
Statistics and Probability	15–25

The Common Curriculum emphasizes that concepts need to be developed gradually; concepts should be introduced using manipulatives, and developed from the concrete to the pictorial to the symbolic. Moreover, a minimum of half of the available time within all strands needs to be dedicated to the mathematical processes of communication, connections, estimation and mental math, technology, problem solving, reasoning, and visualization. Further, there should be a balance between estimation and mental math, paper-and-pencil exercises, and the appropriate use of calculators and computers.

Overview of Mathematics 7

The distance learning materials have been designed to provide students with the opportunity to meet the expected student outcomes specified in the Common Curriculum.



Concepts are carefully developed and learning aids are frequently used to help students visualize the concepts. The various mathematical processes identified in the Common Curriculum are stressed. For example, the problem-solving process is described in the beginning of each Student Module Booklet, many problem-solving strategies are demonstrated in the Appendix of Module 1, and there are problem solving opportunities in each activity. Also, connections are made with the everyday world and with previously developed skills and knowledge.

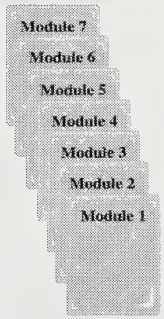
Every attempt has been made to give students a variety of activities and to make mathematics real and interesting. Videos, learning aids, games, and technology are integrated to cater to learning-style preferences of individual students. Therefore, this distance learning course is more than a textbook; it is a complete learning package.

Structure of the Learning Package

Basic Design

This learning package involves many other components in addition to the Learning Facilitator's Manual. A survey of the components will show you that the course is divided into clumps of learning called modules. For each module there are two print components: a Student Module Booklet and an Assignment Booklet.

Student Module Booklets



Student Module Booklets contain guided activities that instruct students in a relevant, realistic setting.

These booklets have been specially designed to promote such qualities in the learner as autonomy, independence, and flexibility. Writers have incorporated such teaching strategies as working from the concrete to the abstract, linking the old to the new, getting students actively involved, and using advance, intermediate, and post organizers. Many other techniques are used to cater to individual learning styles and preferences. The materials have been designed to include a variety of pathways and options because they are intended for a broad range of use within and beyond Alberta.

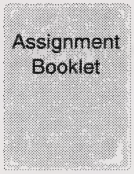
Contents
Overview Evaluation
Section 1 Activity 1 Activity 2 etc.
Section 2 Activity 1 Activity 2 etc.
Module Summary
Appendix

The structure of the Student Module Booklets follows a systematic design. Each booklet begins with a detailed table of contents that shows the students all of the main steps; this page acts as an organizer for students. The Module Overview introduces the module topic or theme and includes a graphic representation to help visual learners and poor readers. This introduction also includes an evaluation statement, so students are informed of the weightings of each assignment.

The body of the Student Module Booklet is made up of two or more closely related sections. Each section contains student activities that develop skills and knowledge centred around a theme. The activities may include print, audio, video, computer, or Internet involvement. Computer and Internet activities are optional. At times, the student and the learning facilitator are allowed to choose the activity that best suits the student's needs and interests. Each section also includes other activities such as the Extra Help and Enrichment as optional pathways. This flexibility caters to each student's personal situation.

Following the last section is a modular summary that focuses on the skills and strategies that the student has learned. The Student Module Booklet ends with an Appendix that includes a Glossary and Suggested Answers for the self-assessment work.

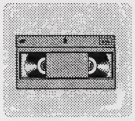
Assignment Booklet



Accompanying each Student Module Booklet is an Assignment Booklet. The activities in the Assignment Booklets can be used for both formative and summative assessments. Students should complete these assignments when they have thoroughly reviewed the other module materials. You may decide to have students submit their work as soon as they have completed each sectional assignment or you may choose to let students complete all the sectional assignments within the module before evaluating their work. The Assignment Booklets have been designed for both in-classroom use and for distance learning. **If the Assignment Booklets are not being mailed, remove the green outside mailing covers before distributing the booklets to students.**

Media

INTERNET



VIDEOCASSETTE

COMPUTER DISK

Internet references are found throughout the course; exploring those references, however, is optional for students. In most cases, students are given suggested topics that they may explore through the Internet's search engines. In rare cases, students might be given a specific Uniform Resource Location (URL), but they should be aware that these addresses are subject to change.

Updated information about the Alberta Distance Learning Centre and this course and others can be found by starting at the Alberta Distance Learning Centre's home page at **http://ednet. edc. gov. ab. ca/level3/adlc/300/adlchome.html** or by going straight to the ADLC Courses page at **http://ednet. edc. gov.ab.ca/level3/adlc/400/courses.html**.

There are also activities in this course that require students to view videos. These mandatory videos are listed on the following pages. It is important that you acquire these videos so students have access to them when needed.

There are also activities in this course that direct students to use computer software. The use of these software packages is optional. If you want students to have access to these software packages, arrangements should be made to ensure they are available. A list of the computer software appears on the following pages.

Other Materials

There are no response spaces provided in the Student Module Booklets for Mathematics 7; this means students will need a binder with loose leaf and graph paper for responses. They will also need a scientific calculator and a mathematical instrument set (compass, metric ruler, plastic triangles, and protractor). As well, students will need a variety of supplies such as heavy paper (card stock), scissors, glue, coloured pencils or felt pens, and masking tape.

Blackline masters for many of the learning aids referred to in Mathematics 7 are provided in several of the Student Module Booklets. You may laminate photocopies of these pages, or you may prefer to provide students with some of the following manipulatives that are commercially available: pattern blocks, base ten blocks, Unifix Cubes, and bingo chips or checkers.

Instructions are given for making some of the other learning aids referred to in Mathematics 7. For example, students can make hoops from wire, hinged mirrors from two identical small rectangular mirrors, miras from rectangular pieces of plexiglass, a spinner from a paper clip and sharpened pencil, and dice from sugar cubes. Instead of having students make some of these learning aids, you may wish to order attribute hoops, mirrors, miras, and dice from suppliers of educational materials.

Suggestions are made for field trips. In Module 6, students are asked to estimate the length, mass, or capacity of many common objects and check their estimates by measuring; to accomplish this task students will need access to many common items and measuring tools. Students are asked to visit a supermarket (to use the scales in the produce department), a school laboratory (to use the scientific balances), businesses, sporting clubs, or service groups in the community (to find out how people use measurement), a social studies classroom or library (to use globes in their study of time zones), and a graphic artist (to discover how traditional drafting tools can be used to draw parallel lines and how computers can be used to draw angles and slide, flip, or turn figures). In Module 7, students are asked to visit a library to do research. You may wish to make arrangements for these field trips well in advance. For some of these learning activities, you may wish to have speakers come to your classroom.

Materials, Media, and Equipment

Mandatory Components

Equipment (Hardware)	Media	Materials
• videocassette player • scientific calculator • mathematical instrument set	• Mandatory Video List: – *Number Theory, Adding and Subtracting Fractions, Integers, and Equations: Solving in One Step* from *Math Moves* series – *Why We Have Time Zones* – *The Percent* from *Mathways* series – *Tessellations* from *Math Vantage* series	• LFM for Mathematics 7 • one complete set of Student Module Booklets (7) and Assignment Booklets (7) for each student • There is a Final Test.

Videocassettes used in this course may be available from your regional library service. If not, you can obtain the videos from either of the following:

- Learning Resources Distributing Centre
  12360-142 St.
  Edmonton, AB
  T5L 4X9
  Phone: (403) 427-5775
  FAX: (403) 422-9750
  Internet: **http://www.lrdc.edc.gov.ab.ca/**

- ACCESS – THE EDUCATION STATION
  LEARNING AND SKILLS TELEVISION OF ALBERTA LTD.
  3720-76 Ave.
  Edmonton, AB
  T6B 2N9
  Phone: (403) 440-7777 (inside Edmonton)
  1-800-252-9363 (outside Edmonton)
  FAX: (403) 440-8899
  Internet: **http://www.ccinet.ab.ca/access/**

Optional Components

Equipment (Hardware)	Media	Materials
• computer	• Optional Computer Software List: – a browser such as *Netscape*™ to access the Internet – a spreadsheet program such as *ClarisWorks*™ – a Logo program such as *Logo PLUS*™ *for the Macintosh*® from Terrapin Software, Inc. – *Number Munchers*™ and *TesselMania!*™ from MECC	• assorted materials

Note: *Number Munchers*™ is a member of the Muncher family of MECC products; it is also available under the title *Math Munchers*™ *Deluxe*.

Computer software used in this course may be available from your regional library service. If not, the Learning Resources Distributing Centre can provide information on distributors.

You may also find information regarding the software on the Internet. Software sites may include up-to-date program information, resource information, demonstrations, and programs available for downloading.

Using This Learning Package in the Classroom

Conventional Classroom

Whether your classroom has desks in rows or tables in small groups, you may be most comfortable with a learning system that you can use with all your students in a paced style. In other words, you may want a package that will suit all of your students, so they can move through the materials as one group or several small groups. Because these materials contain different routes or pathways within each module, they can address various learning styles and preferences. The materials also include many choices within the activities to cater to different thinking levels and ability levels. Because of their versatility and flexibility, these materials can easily suit a conventional classroom.

Open Learning Classroom

Open learning is the concept of opening up opportunities by overcoming barriers of time, pace, and place by giving the learners a package specially designed to enable them to learn on their own for at least some of the time.

Such a concept is not new. Many teachers can recite attempts to establish an individualized learning system as they recognized the importance of trying to personalize courseware to meet each individual's needs. But these past efforts often failed because of lack of time and lack of quality materials that conformed to Alberta specifications.

Owing to advanced educational technology and improved Alberta-specific learning packages, a student-centred approach is now possible. Improved technology now allows us to provide support to learners individually, regardless of their pace or location. A teacher cannot be in twenty-eight places at one time offering guidance. Media and a well-designed learning package, however, can satisfy individual needs. Technology can also help provide an effective management system needed to track the students as they progress independently through the materials.

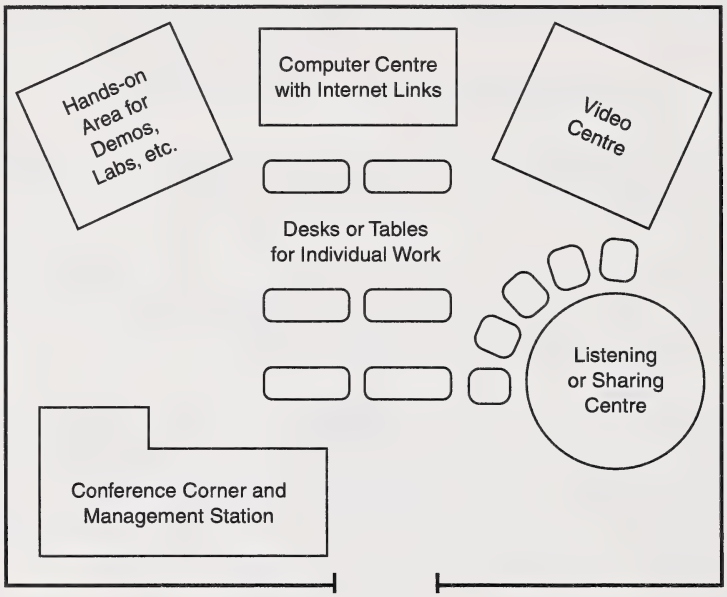
The key to a successful open learning system depends on three vital elements: a learning package specially designed to enable students to learn effectively on their own for at least some of the time; various kinds of learner support; and a management system and style that ensures that the open learning system runs smoothly.

The Key to a Successful Open Learning System

Learning Package

The specially designed learning package needed for a successful open learning system has been developed for you. The objectives teach current Alberta specifications using strategies designed for individualized instruction. As the learning facilitator, you need to be sure to have all of the components in the learning package available to students as needed.

If you are able to acquire media and appropriate hardware to meet your class needs, media centres can be established.


Hands-on Area for Demos, Labs, etc.
Computer Centre with Internet Links
Video Centre
Desks or Tables for Individual Work
Listening or Sharing Centre
Conference Corner and Management Station

You may not have the luxury to have enough hardware to set up a permanent video or computer centre in your classroom. In that case, students should be encouraged to plan ahead. Perhaps every three to five days they should preview their materials and project when they would need a certain piece of media. This would allow you to group students, if necessary, or reserve media as required.

Support

Support is definitely a key element for successful learning, and when you're planning an individualized, non-paced program, you need to carefully plan when and how support will be given.

The materials contain a form of consistent support by providing immediate feedback for activities included in the Student Module Booklet. Students have solutions, models, explanations, and guides included in the Appendix of every booklet. These aids are included so students can receive immediate feedback to clarify and reinforce their basic understanding before they move on to higher levels of thinking.

As the learning facilitator, you may need to offer more support and personal guidance to those students having difficulty. The activities include choices and pathways. If a student is struggling, you may need to encourage that student to work on all of the choices rather than on only one. This would provide additional instruction and practice in a variety of ways.

You may also have to reinforce the need for students to do the sectional activities carefully and thoroughly before attempting the assignments in the Assignment Booklet.

Another form of support is routine contact with each individual. This contact might be achieved with a biweekly conference scheduled by you; or, as students reach a certain point (e.g., after each section is completed), they may be directed to come to the conference area.

Special counselling may be needed to help students through difficult stages. Praise and encouragement are important motivators, particularly for those students who are not used to working independently.

Direct teaching may be needed and scheduled at certain points in the program. This teaching might involve small groups or a large group. It might be used to take advantage of something timely (e.g., election, eclipse), something prescheduled like the demonstration of a process, or something involving students in a hands-on, practical experience.

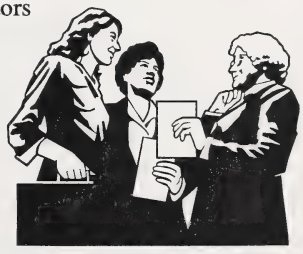
Support at a distance might include tutoring by phone, teleconferencing, faxing, or planned visits. These contacts are the lifeline between learners and distance education teachers, so a warm dialogue is essential.

Management

Good management of an open learning system is essential to the success of the program. Leadership and promotion of the system are essential. The following areas also need action to ensure that the system runs smoothly:

- Scheduling, Distributing, and Managing Resources—As discussed earlier, in order to do these tasks efficiently you may need to develop media centres or a system for students to reserve the necessary resources.

- Scheduling Students—Students and teachers should work together to establish goals, course completion timelines, and daily timelines. Although students may want to study for long periods of time (e.g., all morning), learning facilitators should discourage this practice. Concentration, retention, and motivation are improved by taking scheduled breaks.



- Monitoring Student Progress—You will need to record the date that each student completes each module. Your data might also include the projected date of completion if you are using a student-contract approach.

Sample of a Student Progress Chart

Mathematics 7		Module 1	Module 2	Module 3	Module 4	Module 5	Module 6	Module 7	Final Test
Billy Adams	P								
	A								
Louise Despins	P								
	A								
Violet Klaissian	P								
	A								
P = Projected Completion Date A = Actual Completion Date									

The student could keep a personal log as well. Such tracking of data could be stored easily on a computer.

- Recording Student Assessments—You will need to record the marks awarded to each student for work completed in each module Assignment Booklet. The marks from these Assignment Booklets will contribute to a portion of the student's final mark. Other criteria may also be added (a special project, effort, attitude, etc.). Whatever the criteria, they should be made clear to all students at the beginning.

Sample of a Student Assessment Chart

Mathematics 7	Module 1	Module 2	Module 3	Module 4	Module 5	Module 6	Module 7	Year's Average	Final Test	Final Mark
Billy Adams	**67**	**65**	**54**	**47**	**78**	**67**	**63**	**63**		
Louise Despins	**43**	**50**	**54**	**55**	**48**	**42**	**49**	**49**		
Violet Klaissian	**65**	**65**	**66**	**68**	**67**	**70**	**67**	**67**		

Letter grading could easily be substituted.

- Recording Effectiveness of System—Keep ongoing records of how the system is working. This data will help you in future planning.

Sample of a System Assessment Chart

Module 1			
Date	Student Module Booklet	Assignment Booklet	Resources/Media

The Role of the Teacher in an Open Learning Classroom

The teachers in a conventional classroom spend a lot of time talking to large groups of learners. The situation in open learning requires a different emphasis. Teachers will probably meet learners individually or in very small groups.

With this approach, it is necessary to move beyond the idea of a passive learner depending largely on a continually supportive teacher. The teacher must aim to build the student's confidence, to stimulate the learner into self-reliance, and to guide the learner to take advantage of routes that are most meaningful and applicable to the learner.

These materials are student centred, not teacher centred. The teacher needs to facilitate learning by providing general support to the learner.

Evaluation

Evaluation is important to the development of every learner. In order to identify strengths and weaknesses, both students and teachers need to gather and analyse information and make decisions.

These specially designed learning packages contain many kinds of informal and formal evaluation.

Informal Evaluation

Observation

In the classroom, the teacher has the opportunity to see each student perform every day and to become aware of the level and nature of each student's performance.

Observations are more useful if they are recorded in an organized system. The following list of questions is a sample of types of observations and how they can be collected.

Observation Checklist

1. Does the student approach the work in a positive manner?
2. Is the student struggling with the reading level?
3. Does the student make good use of time?
4. Does the student apply an appropriate study method?
5. Can the student use references effectively?

	B. Adams	L. Despins	V. Klaissian	H. Smith	K. Dalley

Observation may suggest a need for an individual interview with a student.

Individual Conferences

Individual conferences may be paced (scheduled) by the calendar, designated at certain points in the module, or they may be set up only as needed or requested.

During these conferences, the teacher can determine the student's progress and can assess the student's attitudes towards the subject, program, school, and self, as well as the student's relationship with other students. With guided questions, the teacher can encourage oral self-assessment; the student can discuss personal strengths or weaknesses in regard to the particular section, module, or subject area.

Self-Appraisal

Self-appraisal helps students recognize their own strengths and weaknesses. Through activities that require self-assessment, students also gain immediate feedback and clarification at early stages in the learning process. Teachers need to promote a responsible attitude towards these self-assessment activities. Becoming effective self-assessors is a crucial part of becoming autonomous learners. By instructing, motivating, providing positive reinforcement, and systematically supervising, learning facilitators will help students develop a positive attitude towards their own progress.

For variation, students may be paired and peer-assessing may become part of the system. The teacher may decide to have the student self-assess some of the activities, to have a peer assess other activities, and to become directly involved in assessing the remainder of the activities.

When the modular activities have been assessed, students should be directed to make corrections. This task should be made clear to students right from the beginning. It is important to establish the correct association between the question and the response to clarify understanding, aid retention, and be of use for study purposes.

Many of the activities include choices for students. If students are having difficulty, more practice may be warranted, and students may need to be encouraged to select more of the choices.

Each section within a Student Module Booklet includes additional types of activities called Extra Help and Enrichment. Students are expected to be involved in the decision as to which pathway best suits their needs. They may decide to do both.

Self-appraisal techniques can also be introduced at the individual conferences. Such questions as the following might be included:

- What steps are you taking to improve your understanding of this topic?
- What method of study do you use most?
- How do you organize the material to help you remember it?
- What steps do you follow when you complete an assignment?
- What could you do to become an even better reader?
- Do you have trouble following directions?
- Did you enjoy this module?

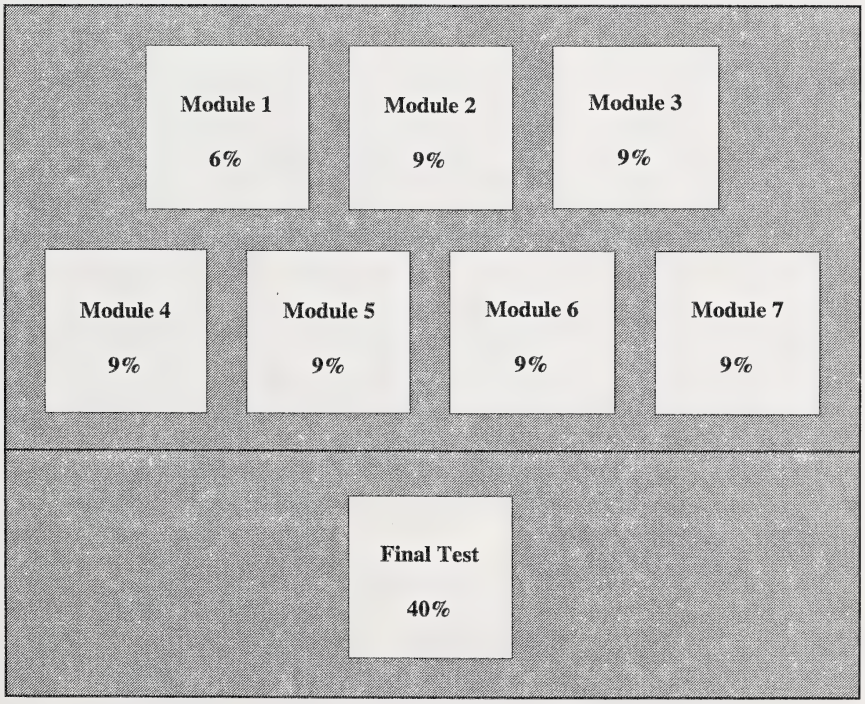
A chart or checklist could be used for recording responses.

Assignments

Each module contains a separate booklet called the Assignment Booklet. This booklet is an informal evaluation tool for assessing the knowledge or skills that the student has gained from the module. **The student's mark for the module may be based solely on the outcome of learning evident in the Assignment Booklet; however, you may decide to establish a value for other variables such as attitude or effort.** It is important that you establish at the beginning of the course and each module those outcomes that will be evaluated, and ensure that all students clearly understand what is expected.

Formal Evaluation

This LFM includes a formal Final Test that can be photocopied for each member of the class. The test, closely linked to the learning outcomes stated in the Student Module Booklets, gives the teacher precise information concerning what each student can or cannot do. Answers, explanations, and marking guides are also included. The value of the Final Test and each module is the decision of the classroom teacher. Following is a suggestion only.



Introducing Students to the System

Your initiation to these learning materials began with a basic survey of what was included and how the components varied. This same process should be repeated with the class. After the materials have been explored, a discussion might include the advantages and the disadvantages of learning independently or in small groups. The roles of the student and teacher should be analysed. The necessary progress checks and rules need to be addressed. Your introduction should motivate students and build a responsible attitude towards learning autonomously.

Skill Level

It is important for students to understand that there are certain skills that they will need in order to deal successfully with the course materials. Those skills are as follows:

- understanding and using instructional materials (table of contents, index, appendices, and glossary)
- interpreting tables, graphs, and diagrams
- using reference materials
- recognizing special symbols
- using a scientific calculator
- understanding and using different forms of media

Other general skills follow: using reliable study methods, outlining, and learning to read at a flexible rate.

To decide the level and amount of instruction needed to accommodate the varied levels among students, you may wish to prepare and administer skill inventories or pretests. If most students need help with a particular skill, you may want to plan a total-class instructional session. If only certain students lack a skill, you may want to set up a temporary skill group to help students who need it, or you may want to develop a skills file for this purpose.

Reading Level

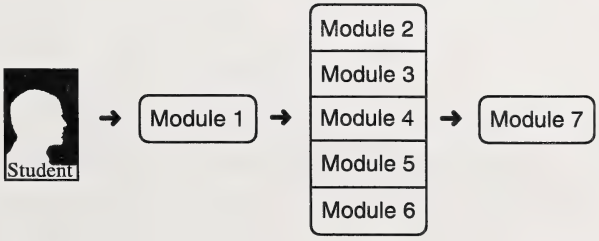
These course materials are largely print based, but poorer readers need not be discouraged. It is important that you assure students that these materials have been designed for easy reading. The authors have employed special strategies to reduce and control the reading level. Some of them are

- the conscious selection of vocabulary and careful structuring of sentences to keep the materials at an independent reading level
- the integration of activities, examples, and illustrations to break text into appropriate-sized chunks

- the inclusion of many kinds of organizers (advance, graphic, intermediate, concept mapping, post organizers) to help give students a structure for incorporating new concepts
- the recognition that vocabulary and concepts are basic to understanding the content and, thus, must be handled systematically (defined in context, signalled in marginal notes or footnotes, and cited in a glossary)
- the acknowledgement that background knowledge and experience play a vital role in comprehension
- the systematic inclusion of illustrations, videos, audiocassettes, and software to help poorer readers and visual learners
- a use of a variety of formats (paragraphs, lists, charts, etc.) to help struggling readers who do not absorb or retain main ideas easily in paragraph format
- the inclusion of media and activity choices to encourage an active rather than passive approach
- the development of instruction in a meaningful setting rather than in a contrived, workbook style
- the use of purposeful reading, viewing, and doing to produce better interpretation of the course materials
- the recognition that students need structured learning experiences when reading, viewing, or listening to instructional materials; and the acknowledgement that the recognized reading process provides such a structured framework by emphasizing the following phases: developing pupil readiness, determining the purpose, providing guided instruction and feedback, ensuring opportunity to reread or review if necessary, and including enrichment or extensions

To help make the learning package more readable, you can begin your course or module preparation by reading (viewing, listening to) all the related materials that are going to be used. You will need this solid understanding in order to link the content to the students' experiential base. This linking may be done through class brainstorming sessions concerning the topic or by using visuals and guided questions to predict what the course or modules might be about. Such a strategy helps poorer readers strengthen their abilities to be able to predict new vocabulary.

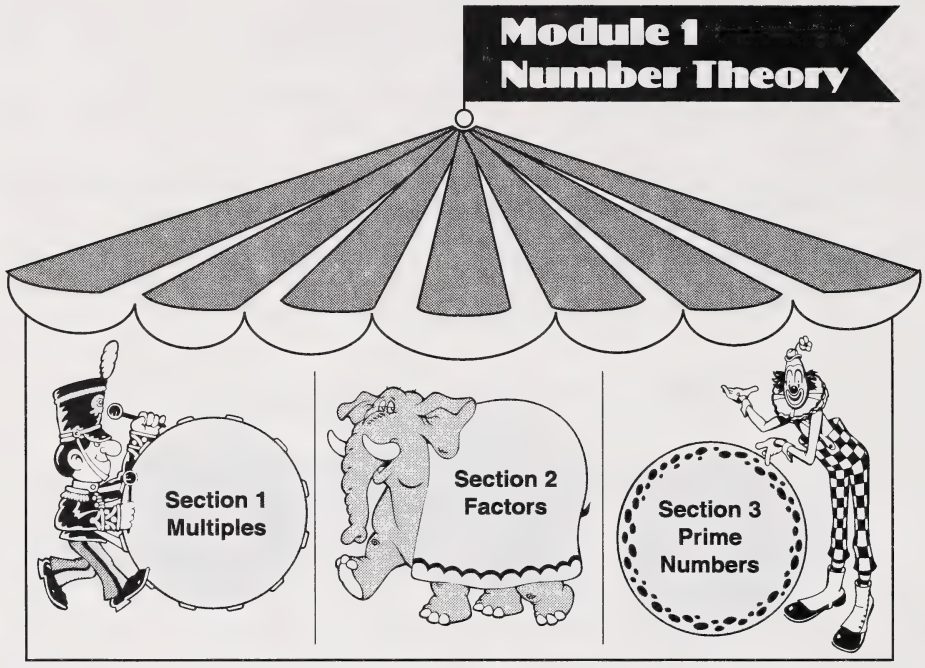
It is recommended that you have students begin with Module 1, because this module includes basic introductory information, and it is also recommended that you end with Module 7, because this module acts as a summary or culmination.



Module 1: Number Theory

Overview

In Module 1 students will increase their number sense by studying number theory. They will discover many ways that numbers are related and come to better understand the structure of numbers.



Evaluation

The evaluation of this module will be based on four assignments:

Section 1 Assignment	**25 marks**
Section 2 Assignment	**25 marks**
Section 3 Assignment	**25 marks**
Final Module Assignment	**25 marks**
TOTAL	**100 marks**

Section 1: Multiples

Key Concepts

- multiples
- least common multiples
- Venn diagrams

The basic goals of this section are to ensure that students can list the multiples of a number, find the least common multiple of two or more numbers, and sort numbers using Venn diagrams.

Gathering Materials

Students will need a scientific calculator. Students may need toothpicks and either string or wire to make hoops. (Alternatively, students may use attribute hoops. These are available from suppliers of educational materials.)

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT.

Students who wish to do the Extra Help will need a videocassette player, the video program *Number Theory* from the series *Math Moves*, and several cubes (for example, Unifix Cubes, small base ten blocks, sugar cubes, or wooden blocks). Students will also need multiple boards. (You may wish to photocopy the page of multiple boards in the Appendix of the Student Module Booklet so that students may cut out these learning aids. The page can be glued to heavier paper or laminated first; this will make the multiple boards easier to handle.)

Students who wish to do the Enrichment will play either a board game or a computer game. To play the board game, students will need a pair of standard dice and several disks of two colours (for example, buttons, bingo chips, checkers, coins). To play the computer game, students will need the program *Number Munchers*™ (or *Math Munchers*™ *Deluxe*) from MECC.

Section 1: Assignment Answer Key (25 marks)

1. Students may use the automatic constants on their calculators to list the multiples of 6. They also may use multiplication or addition.

Method 1: Using Multiplication

6,	12,	18,	24,	30
↑	↑	↑	↑	↑
1×6	2×6	3×6	4×6	5×6

Method 2: Using Addition

6,	12,	18,	24,	30
↑	↑	↑	↑	↑
6	6+6	12+6	18+6	24+6

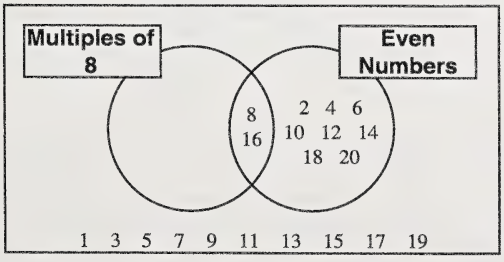
The first five multiples of 6 are 6, 12, 18, 24, 30. **(2 marks)**

2. Students may use the automatic constants to list the multiples of 6, 8, and 10. They also may use multiplication or addition.

6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96, 102, 108, 114, 120
8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120
10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120

The least common multiple of 6, 8, and 10 is 120. **(4 marks)**

3.



(5 marks)

4. Every customer who receives a carnation will have a number that is a multiple of 7. Students may use the automatic constants on their calculators to list the multiples of 7. They may also use multiplication or addition.

The numbers of the first ten customers to receive a carnation are as follows: 7, 14, 21, 28, 35, 42, 49, 56, 63, and 70. **(4 marks)**

5. a. **Step 1:** Students may use the automatic constants on their calculators to list the multiples of 6 and 8. They may also use multiplication or addition.

fish burgers: 6, 12, 18, 24, 30, ...
hamburgers: 8, 16, 24, 32, ...

Step 2: Students use inspection to find the least common multiple.

fish burgers: 6, 12, 18, [24], 30, ...

hamburgers: 8, 16, [24], 32, ...

Step 3: Students calculate the date when fish burgers and hamburgers will be served together by counting 24 days **after** October 1.

OCTOBER						
S	**M**	**T**	**W**	**T**	**F**	**S**
	F H 1	2	3	4	5	6
F 7	8	H 9	10	11	12	F 13
14	15	16	H 17	18	F 19	20
21	22	23	24	F H [25]	26	27
28	29	30	31			

Legend
F – fish burgers
H – hamburgers

On Thursday, October 25, fish burgers and hamburgers will be served together again. **(3 marks)**

b. Students calculate the date when fish burgers and hamburgers are next served together by counting 24 days **after** October 1 (skipping Sundays).

OCTOBER						
S	**M**	**T**	**W**	**T**	**F**	**S**
	F H 1	2	3	4	5	6
~~7~~	F 8	9	H 10	11	12	13
~~14~~	F 15	16	17	18	H 19	20
~~21~~	F 22	23	24	25	26	27
~~28~~	F H [29]	30	31			

Legend
F – fish burgers
H – hamburgers

On Monday, October 29, fish burgers and hamburgers will be served together again. **(2 marks)**

6. **Step 1:** Students may use the automatic constant feature on their calculators to list all the multiples of 7 and 8 less than or equal to 200. They may also use addition or multiplication.

   7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140, 147, 154, 161, 168, 175 , 182, 189, 196

   8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120, 128, 136, 144, 152, 160, 168, 176 , 184, 192, 200

   Step 2: To limit the possible ages, students examine the multiples between 150 and 200.

   7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140, 147, 154, 161, 168, 175 , 182, 189, 196

   8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120, 128, 136, 144, 152, 160, 168, 176 , 184, 192, 200

   The possible age of the building is 152, 160, 168, 176, 184, 192, or 200 years.

   Step 3: Students use logic to find the age of the building; students look at the multiples between 150 and 200 and find a multiple of 8 that is one more than a multiple of 7.

   7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140, 147, 154, 161, 168, 175, 182, 189, 196

   8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120, 128, 136, 144, 152, 160, 168, 176, 184, 192, 200

   The building is 176 years old. **(5 marks)**

Section 2: Factors

Key Concepts

- factors
- divisibility rules
- greatest common factor
- powers

The basic goals of this section are to ensure that students can determine if a number is a factor of another number, use inductive reasoning to discover the divisibility tests and apply these tests, list all the factors of a number, find the greatest common factor of two or more numbers, and write the product of identical factors as a power.

Gathering Materials

Students will need a scientific calculator.

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT.

Students who wish to the Extra Help will need a videocassette player, the video program *Number Theory* from the series *Math Moves*, and several cubes (for example, Unifix Cubes, small base ten blocks, or sugar cubes).

If students wish to play the game in the Enrichment, they will need disks labelled 1 to 25. (You may wish to photocopy the page of disks in the Appendix of the Student Module Booklet so that students may cut out these learning aids. The page can be glued to heavier paper or laminated first; this will make the disks easier to handle.)

Section 2: Assignment Answer Key (25 Marks)

1.

63	
1	63
~~2~~	
3	21
~~4~~	
~~5~~	
~~6~~	
7	9
~~8~~	
~~9~~	~~7~~

The factors of 63 are 1, 3, 7, 9, 21, and 63. **(2 marks)**

2.

45	
①	45
~~2~~	
③	⑮
~~4~~	
⑤	9
~~6~~	
~~7~~	
~~8~~	
~~9~~	~~5~~

60	
①	60
2	30
③	20
4	⑮
⑤	12
6	10
~~7~~	
~~8~~	
~~9~~	
~~10~~	~~6~~

The greatest common factor of 45 and 60 is 15. **(2 marks)**

3. a.

70	
①	70
②	35
~~3~~	
~~4~~	
5	⑭
~~6~~	
⑦	10
~~8~~	
~~9~~	
~~10~~	~~7~~

42	
①	42
②	21
3	⑭
~~4~~	
~~5~~	
6	⑦
~~7~~	~~6~~

56	
①	56
②	28
~~3~~	
4	⑭
~~5~~	
~~6~~	
⑦	8
~~8~~	~~7~~

The greatest common factor of 70, 42, and 56 is 14.

So, the greatest number of worms in each container is 14. **(3 marks)**

b. $70 \div 14 = 5$ $42 \div 14 = 3$ $56 \div 14 = 4$

If each container had 14 worms, Mary bought 5 containers, Shawna bought 3 containers, and Fatima bought 4 containers. **(1 mark)**

4. **a.** Yes, 52 608 is even. **(2 marks)**

b. Yes, $5+2+6+0+8=21$, and 21 is divisible by 3. **(2 marks)**

c. Yes, 08 is divisible by 4. **(2 marks)**

d. No, 52 608 does not end in 0 or 5. **(2 marks)**

e. Yes, 52 608 is even and the sum of its digits is divisible by 3. **(2 marks)**

f. Yes, 608 is divisible by 8. **(2 marks)**

5. **a.** In factored form, $3^5 = 3\times3\times3\times3\times3$. **(2 marks)**

b. In power form, $4\times4\times4\times4\times4\times4 = 4^6$. **(2 marks)**

c. In standard form, $7^4 = 2401$. **(1 mark)**

Section 3: Prime Numbers

Key Concepts

- prime numbers
- composite numbers
- prime factorization

The basic goals of this section are to ensure that students can sort numbers into categories such as prime, composite, perfect, abundant, and deficient; that students can find the prime factorization of numbers; and that students can use prime factorization to find the greatest common factor or the least common multiple of two or more numbers.

Gathering Materials

Students may need five disks (for example, bingo chips, buttons, coins, checkers) and five jars.

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT.

Students who wish to do the Extra Help will need a videocassette player, the video program *Number Theory* from the series *Math Moves*, and several cubes (for example, Unifix Cubes, small base ten blocks, or sugar cubes).

Students who wish to play the board game will need a pair of standard dice. Students who wish to play the computer game will need the program *Number Munchers*™ (or *Math Munchers*™ *Deluxe*) from MECC.

Section 3: Assignment Answer Key (25 Marks)

1. Answers will vary. The student may use the sieve of Eratosthenes to find the prime numbers. Then the student will use the guess, check, and revise method to find the sums. Here are two possible solutions.

a. $53=2+3+7+11+13+17$

or

$53=2+3+5+7+17+19$ **(3 marks)**

b. $57=11+17+29$

or

$57=3+17+37$ **(3 marks)**

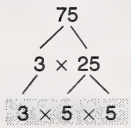
2.

or

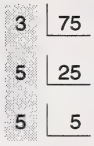
2	56
2	28
2	14
7	7
	1

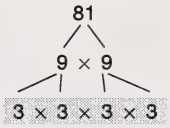
$56=2\times2\times2\times7$ **(3 marks)**

3.

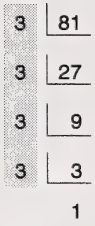


or





or



$75 = 3 \times 5 \times 5$

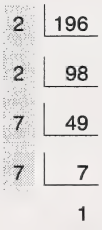
$81 = 3 \times 3 \times 3 \times 3$

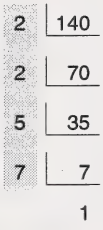
a. GCF = 3 **(4 marks)**

b. $\text{LCM} = 3 \times 3 \times 3 \times 3 \times 5 \times 5$

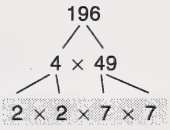
$= 2025$ **(4 marks)**

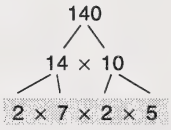
4. Students should ask themselves "What is the GCF of \$196 and \$140?" Students can use prime factorization to find the GCF.





or





$196 = 2 \times 2 \times 7 \times 7$

$140 = 2 \times 2 \times 5 \times 7$

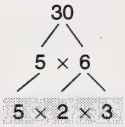
$\text{GCF} = 2 \times 2 \times 7$

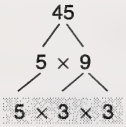
$= 28$

The most each ticket could cost is \$28. Since you have \$35, you can afford to buy a ticket. **(5 marks)**

5. Students should ask themselves "What is the LCM of 30 and 45?" Students can use prime factorization to find the LCM.

or





$30 = 2 \times 3 \times 5$

$45 = 3 \times 3 \times 5$

$\text{LCM} = 2 \times 3 \times 3 \times 5$

$= 90$

The two sets of lights blink at the same time every 90 s. **(3 marks)**

Note: Students may also solve this problem by listing the multiples of 30 and 45 and finding the LCM.

30, 60, (90), 120
45, (90), 135

Final Module Assignment Answer Key (25 Marks)

Part 1: Multiple Choice

1. B **(2 marks)** **2.** A **(2 marks)** **3.** C **(2 marks)** **4.** D **(2 marks)** **5.** D **(2 marks)**

Part 2: Problem Solving

1. Students may use the guess and check method to find the numbers which have these characteristics. **Note:** Students may use logic to eliminate guesses of numbers which are not multiples of 3.

Guess	Number	Check	
1	1	✗	
2	2	✗	
3	3	✓	60 is a multiple of 3. ← 3 is a factor of 3. 4 is not a factor of 3.
4	4	✗	
5	5	✗	
6	6	✓	60 is a multiple of 3. ← 3 is a factor of 3. 4 is not a factor of 3.
7	7	✗	
8	8	✗	
9	9	✗	
10	10	✗	
11	11	✗	
12	12	✗	
13	13	✗	
14	14	✗	
15	15	✓	60 is a multiple of 15. 3 is a factor of 15. ← 4 is not a factor of 15.

So, the three lowest numbers with these characteristics are 3, 6, and 15. **(3 marks)**

2. a. Students may guess or use reasoning like this:

Only multiples of 21 have 21 as a factor.

The multiples of 21 are $\underbrace{21, 42, 63}_{\text{lowest}}$, 84, 105,....

So, the three lowest numbers that have 21 as their greatest common factor are 21, 42, and 63. **(3 marks)**

b. Students may guess or use reasoning like this:

The number 21 is divisible by 3, 7, and 21. So, the lowest three numbers that have 21 as their least common multiple are 3, 7, and 21. **(3 marks)**

Note: Students may check their answers by listing the multiples of 3, 7, and 21, and then circling the LCM.

3, 6, 9, 12, 15, 18, (21), 24,...
7, 14, (21), 28, 35,...
(21), 42, 63, 84,...

3. Students may give any 12 of the following powers. Each is less than 100. **Note:** The standard form does not have to be given.

$2^2 = 4,\ 2^3 = 8,\ 2^4 = 16,\ 2^5 = 32,\ 2^6 = 64$

$3^2 = 9,\ 3^3 = 27,\ 3^4 = 81$

$4^2 = 16,\ 4^3 = 64$

$5^2 = 25$

$6^2 = 36$

$7^2 = 49$

$8^2 = 64$

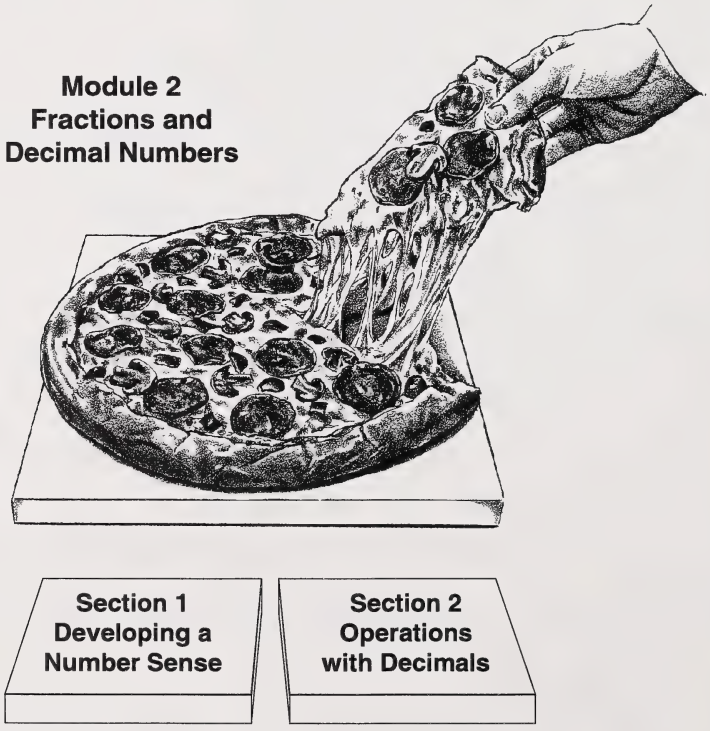
$9^2 = 81$

(6 marks)

Module 2: Fractions and Decimal Numbers

Overview

In Module 2 students will increase their number sense by working with fractions and decimal numbers. They will use fractions and decimal numbers in problem-solving settings. They will model fractions with pattern blocks and they will model decimal numbers with base ten blocks. They will express fractions in different ways, compare and order fractions and decimal numbers, and perform operations on decimal numbers.



Evaluation

The evaluation of this module will be based on three assignments:

Section 1 Assignment	**50 marks**
Section 2 Assignment	**30 marks**
Final Module Assignment	**20 marks**
TOTAL	**100 marks**

Section 1: Developing a Number Sense

Key Concepts

- proper fractions
- improper fractions
- mixed numbers
- terminating decimal numbers
- repeating decimal numbers

The basic goals of this section are to ensure that students develop a number sense for fractions and decimal numbers. By the time they finish the section, students should be able to explain the meaning of a fraction, change fractions from one form to another, and compare and order fractions and decimal numbers.

Gathering Materials

Students will need base ten blocks. (You may wish to photocopy the pages of base ten blocks in the Appendix of the Student Module Booklet so that students may cut out these learning aids. The pages can be glued to heavier paper or laminated first; this will make the base ten blocks easier to handle. Alternatively, you may provide plastic or wooden base ten blocks. These are available from suppliers of educational materials.)

Students will also require a videocassette player, the video program *Adding and Subtracting Fractions* from the series *Math Moves*, and pattern blocks. (You may wish to photocopy the pages of pattern blocks in the Appendix of the Student Module Booklet so that students may cut out these learning aids. The pages can be glued to heavier paper or laminated first; this will make the pattern blocks easier to handle. Alternatively, you may provide plastic or wooden pattern blocks. These are available from suppliers of educational materials.)

Students will also need a scientific calculator.

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT.

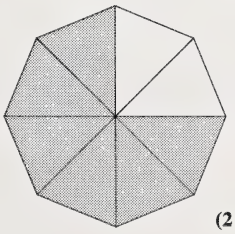
Section 1: Assignment Answer Key (50 marks)

Part 1: Multiple Choice

1. B **(2 marks)** **2.** C **(2 marks)** **3.** C **(2 marks)** **4.** A **(2 marks)** **5.** D **(2 marks)** **6.** A **(2 marks)**
7. A **(2 marks)** **8.** D **(2 marks)** **9.** C **(2 marks)** **10.** A **(2 marks)** **11.** B **(2 marks)**

Part 2: Problem Solving

1. **Note:** Any 6 of the sections can be shaded.



(2 marks)

2. a. $\frac{1}{11} = 0.\overline{09}$ $\frac{2}{11} = 0.\overline{18}$ $\frac{3}{11} = 0.\overline{27}$ $\frac{4}{11} = 0.\overline{36}$ **(2 marks)**

b. Students should notice the following pattern. They may explain it differently.

$$\frac{1}{11} = 0.\overline{09},\ \frac{2}{11} = 0.\overline{18},\ \frac{3}{11} = 0.\overline{27},\ \frac{4}{11} = 0.\overline{36}$$

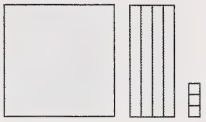
$$1 \times 0.\overline{09} \quad 2 \times 0.\overline{09} \quad 3 \times 0.\overline{09} \quad 4 \times 0.\overline{09}$$ **(2 marks)**

c. $\frac{9}{11} = 0.\overline{81}$ **(2 marks)**

3. a.

(2 marks)

b.



(2 marks)

4. $0.360 = 0.36$

$= \frac{36}{100}$

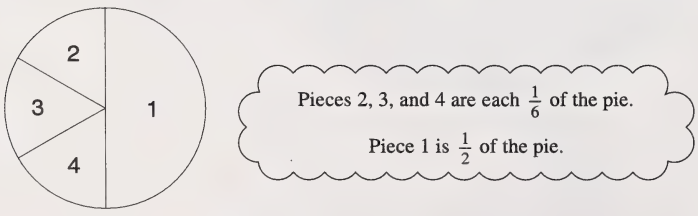
$= \frac{9}{25}$ **(2 marks)**

5.

Player	Batting Average	Order
Alomar, Roberto	0.295	1
Carter, Joe	0.273	4
Myers, Greg	0.262	5
Olerud, John	0.256	6
Sprague, Ed	0.275	3
White, Devon	0.282	2

(5 marks)

6. Students should give an explanation like this: The pieces were not of equal size. The piece she ate was $\frac{1}{6}$ of the pie. The pie may have been cut as shown in the diagram. **(3 marks)**

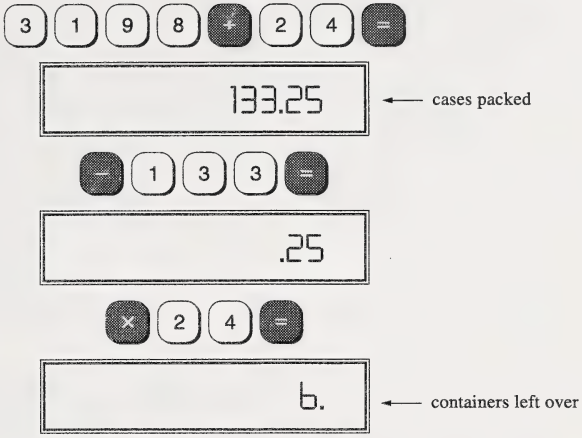


7. The calculations for 7.a., 7.b., and 7.c. will be one of the following:

$$\begin{array}{r} 133 \\ 24\overline{)3198} \\ \underline{24\downarrow} \\ 79 \\ \underline{72\downarrow} \\ 78 \\ \underline{72} \\ 6 \end{array}$$

← full cases

← containers left over



$$\begin{array}{r} 133\ \text{R6} \\ 24\overline{)3198} \end{array} = 133\frac{6}{24}$$

$$= 133\frac{1}{4}$$ ← cases packed

a. The Jacobs packed $133\frac{1}{4}$ or 133.25 cases. **(2 marks)**

b. The Jacobs packed 133 full cases. **(2 marks)**

c. There were 6 containers left over. **(2 marks)**

Section 2: Operations with Decimals

Key Concepts

- adding and subtracting decimal numbers
- multiplying and dividing decimal numbers

The basic goals of this section are to ensure that students develop a sense for what the operations of addition, subtraction, multiplication, and division mean. By the time they finish the section, students should be able to model the operations using base ten blocks and perform operations on paper and with a calculator. They will estimate answers and decide if a calculated answer is reasonable.

If the students complete the Enrichment, they should also be able to do some mental computation with decimals.

Gathering Materials

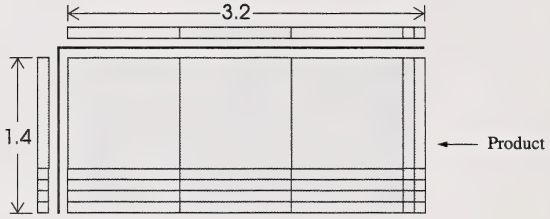
Students will need a scientific calculator. They will continue using the base ten blocks or the shapes of base ten blocks cut from the Appendix of the Student Module Booklet.

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT.

Section 2: Assignment Answer Key (30 marks)

1. a. **Step 1:** Use the factors to complete the rectangular array and find the product.

Step 2: Rearrange the base ten blocks of the rectangular array and trade 10 longs for 1 flat to find the product.

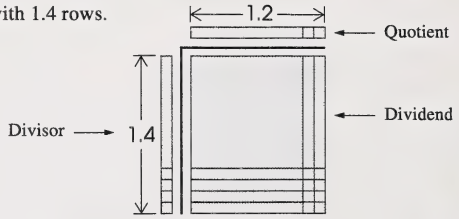


The product is 4.48. **(5 marks)**

b.
$$\begin{array}{r} 3.2 \\ \times\ 1.4 \\ \hline 128 \\ 32 \\ \hline 4.48 \end{array}$$
(3 marks)

c. The number of decimal places in the product is the sum of the decimal places in the factors. **(2 marks)**

2. a. **Step 1:** Arrange the blocks for the dividend to form a rectangular array with 1.4 rows.
Step 2: Find the number of columns in the rectangular array.



The quotient is 1.2. **(5 marks)**

b.
$$\begin{array}{r} 1.2 \\ 1.4\overline{)1.68} \\ 14 \\ \hline 28 \\ 28 \\ \hline 0 \end{array} \quad \textbf{or} \quad \begin{array}{r} 1.2 \\ 14\overline{)16.8} \\ 14 \\ \hline 28 \\ 28 \\ \hline 0 \end{array}$$
(3 marks)

c. Multiply the divisor by 10, 100, 1000,... to form a whole number; then multiply the dividend by the same factor. The decimal point in the quotient will be directly above the decimal point in the new dividend. **(2 marks)**

3. a. If the divisor is less than the dividend, the quotient will be greater than 1. **(2 marks)**
b. If the divisor is greater than the dividend, the quotient will be less than 1. **(2 marks)**

4.

		Rounding to nearest whole number		**Rounding to nearest half**		**Front-end digits**
1.39×3.75	$\doteq$	$1 \times 4 = 4$	**or**	$1.5 \times 4 = 6.0$	**or**	$1 \times 3 = 3$

Estimates using front-end digits are always low.

The lowest estimate is 3; the highest is 6. Yes, Jacques will be able to buy a 3.75-kg bag of apples. **(3 marks)**

5.

Estimate Using Compatible Numbers		Calculated Answer
$\frac{13.2}{2.4} \doteq \frac{12}{2}$		$2.4\overline{)13.20}$
$\doteq 6$	**or**	$\frac{12\,0}{120}$
	$\frac{12}{3}$	$\frac{120}{0}$
	$\doteq 4$	

By estimating, Fatima should be able to make between 4 and 6 tablecloths.
By calculation, Fatima can make 5 tablecloths. **(3 marks)**

Final Module Assignment Answer Key (20 marks)

1. The first-place finisher had a time of 45.55 s; the fourth-place finisher had a time of 47.36 s. The numbers to be subtracted are 47.36 and 45.55.

or

$$\begin{array}{r} {\scriptstyle 6\ 13} \\ 4\not{7}.\not{3}6 \\ -\ 45.55 \\ \hline 1.81 \end{array}$$

The first-place finisher was 1.81 s faster. **(5 marks)**

2.

or

$$\begin{array}{r} 45.9 \\ \times\ \ 28 \\ \hline 3672 \\ 918 \\ \hline 1285.2 \end{array}$$

Ms. Douglas spent 1285.2¢.
1285.2¢ = $12.852
Ms. Douglas spent $12.85. **(5 marks)**

3. **Step 1:** Find the cost of the three CDs. Subtract the cost of the tape from the total price.

or

$$\begin{array}{r} {\scriptstyle 6\,10\ 11\,10} \\ \not{7}\not{1}.\not{2}\not{0} \\ -\ 11.95 \\ \hline 59.25 \end{array}$$

The three CDs cost $59.25.

Step 2: Find the cost of each CD. Divide the total cost of the CDs by 3.

or

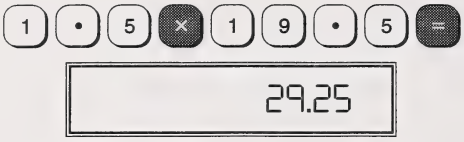
$$\begin{array}{r} 19.75 \\ 3\overline{)59.25} \\ \underline{3} \\ 29 \\ \underline{27} \\ 22 \\ \underline{21} \\ 15 \\ \underline{15} \\ 0 \end{array}$$

or

$$\begin{array}{r} 19.75 \\ 3\overline{)59.25} \\ {\scriptstyle 22\ 1} \end{array}$$

Each CD cost $19.75. **(5 marks)**

4. **Step 1:** Find the distance travelled before resting.

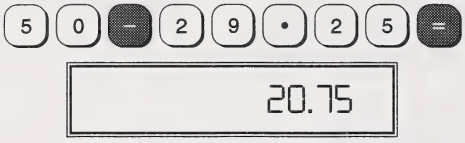


or

$$\begin{array}{r} 19.5 \\ \times\ 1.5 \\ \hline 975 \\ 195 \\ \hline 29.25 \end{array}$$

The cyclist travelled 29.25 km before resting.

Step 2: Find the remaining distance.



or

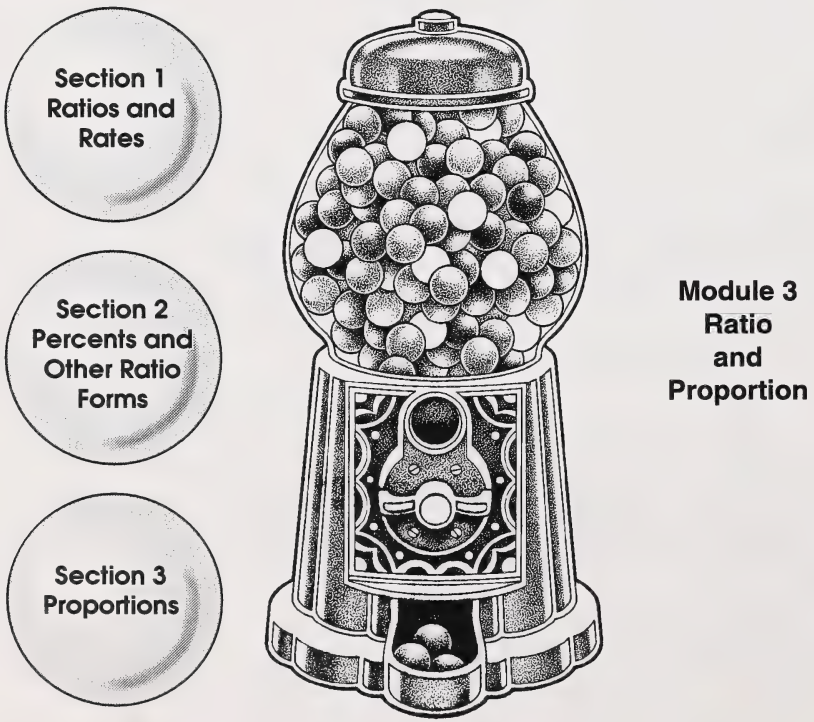
$$\begin{array}{r} {}^{9}\cancel{4}{}^{1}\cancel{0}\ {}^{9}\cancel{1}{}^{1}\cancel{0} \\ \cancel{5}\cancel{0}.\cancel{0}\cancel{0} \\ -\ 29.25 \\ \hline 20.75 \end{array}$$

The cyclist had to travel 20.75 km. **(5 marks)**

Module 3: Ratio and Proportion

Overview

In Module 3 students will increase their number sense by learning about ratio and proportion. They will distinguish between a ratio and a rate. They will write percents and other ratio forms. They will use proportional reasoning to solve ratio, rate, and percent problems.



Evaluation

The evaluation of this module will be based on four assignments:

Section 1 Assignment	**25 marks**
Section 2 Assignment	**25 marks**
Section 3 Assignment	**25 marks**
Final Module Assignment	**25 marks**
TOTAL	**100 marks**

Section 1: Ratios and Rates

Key Concepts

- ratio
- lowest terms
- proportional ratios
- rates
- unit rates
- proportional rates

The basic goals of this section are to ensure that students can distinguish between a ratio and a rate, simplify ratios and rates, and write proportional ratios and rates.

Gathering Materials

Students will need the pattern blocks or the pattern block shapes cut from the Appendix of the Student Module Booklet in Module 2.

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT.

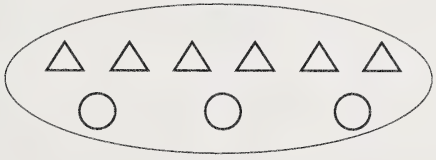
Section 1: Assignment Answer Key (25 marks)

1. **a.** The ratio of the number of circles to the number of triangles is $3:5$. **(2 marks)**

b. The ratio of the number of squares to the number of circles is $\frac{4}{3}$. **(2 marks)**

c. The ratio of the number of triangles to the total number of shapes is 5 to 12. **(2 marks)**

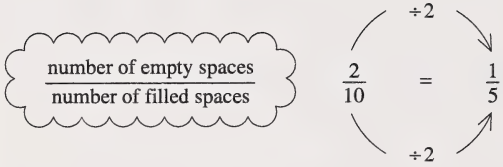
2.



is the same as

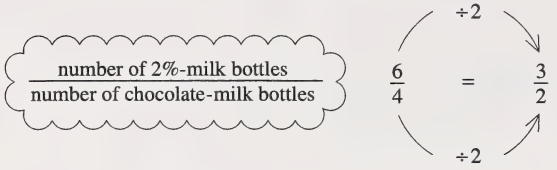
(3 marks)

3. a.



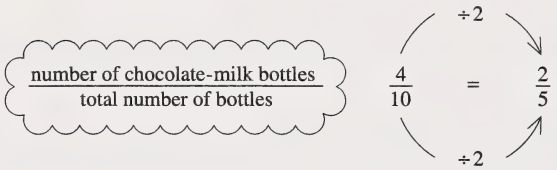
The ratio of the number of empty spaces to the number of filled spaces in the carton is $1:5$. **(2 marks)**

b.



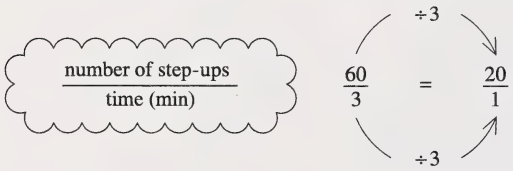
The ratio of the number of 2%-milk bottles to the number of chocolate-milk bottles is $3:2$. **(2 marks)**

c.



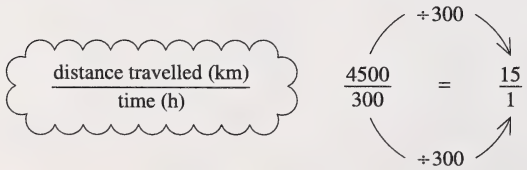
The ratio of the number of chocolate-milk bottles to the total number of bottles is $2:5$. **(2 marks)**

4.



Patty does 20 step-ups per minute. **(2 marks)**

5.



The flying rate of the monarch butterflies is 15 km/h. **(2 marks)**

6. Answers may vary.

a. The cost is \$10 per lesson, \$20 for 2 lessons, \$30 for 3 lessons,... . **(2 marks)**

b. Dan's car consumes 9 L per 100 km, 18 L per 200 km, 27 L per 300 km,... . **(2 marks)**

7. A ratio compares counts or quantities measured in the same unit. So, units are not included in the ratio.

A rate compares a count and a quantity, or two quantities measured in different units. So, units are included in the rate. **(2 marks)**

Section 2: Percents and Other Ratio Forms

Key Concepts

- percents less than 100%
- percents equal to 100%
- percents greater than 100%

The basic goals of this section are to ensure that students recognize that ratios have many different but equivalent forms. Students will write ratios less than 100% as fractions and decimals. Students will write ratios equal to or greater than 100% as whole numbers, mixed numbers, or decimal numbers.

Gathering Materials

Students who wish to do the Extra Help will need a videocassette player and the video program *Percents* from the series *Mathways*.

Section 2: Assignment Answer Key (25 marks)

1. a. Rectangle A

$$\frac{16}{100} = 16\%$$

Rectangle A is 16% of the whole square. **(1 mark)**

b. Rectangle B

$$\frac{24}{100} = 24\%$$

Rectangle B is 24% of the whole square. **(1 mark)**

c. Rectangle C

$$\frac{24}{100} = 24\%$$

Rectangle C is 24% of the whole square. **(1 mark)**

d. Rectangle D

$$\frac{36}{100} = 36\%$$

Rectangle D is 36% of the whole square. **(1 mark)**

2.
$$\frac{4}{10} = \frac{40}{100}$$
$$= 40\%$$

So, 40% of the circles are shaded. **(1 mark)**

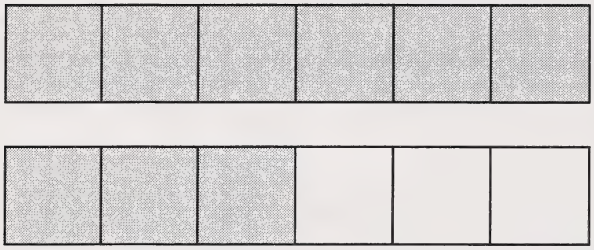
3.
$$\frac{6}{4} = \frac{150}{100}$$
$$= 150\%$$

The number of white squares is 150% of the number of black squares. **(1 mark)**

4.

(2 marks)

5.



The shaded squares in this diagram are 150% of the rectangle in question 4. **(3 marks)**

6.

meat	23%	total	100%
fat	+ 8%	meat + fat	− 31%
	31%		69%

So, 69% of lean ground beef is water. **(2 marks)**

7. **a.** $3\% = \frac{3}{100}$

$= 0.03$

So, 0.03 of sugar-maple sap is maple sugar. **(2 marks)**

b. $3\% = \frac{3}{100}$

So, $\frac{3}{100}$ of sugar-maple sap is maple sugar. **(2 marks)**

8. **a.** $900\% = \frac{900}{100}$

$= \frac{9}{1}$

The ratio of the amount of gasoline to the amount of alcohol in gasohol is 9 to 1. **(2 marks)**

b. $900\% = \frac{900}{100}$

$= 900 \div 100$

$= 9$

So, the amount of gasoline in gasohol is 9 times the amount of alcohol. **(2 marks)**

9. $\frac{600}{3000} = \frac{1}{5}$

$= \frac{20}{100}$

$= 20\%$

So, the Pep Club received 20% of the total sales. **(2 marks)**

10. $\frac{16}{25} = \frac{64}{100}$

$= 64\%$

This is 64%. **(2 marks)**

Section 3: Proportions

Key Concepts

- using proportions to solve ratio, rate, and percent problems
- comparing two ratios or two rates

The basic goal of this section is to ensure students can use proportional reasoning to compare two ratios or two rates, and to solve ratio, rate, and percent problems.

Gathering Materials

Students will need a scientific calculator.

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT.

Section 3: Assignment Answer Key (25 marks)

1. **Shanna** **Shawna**

$$\frac{2}{25} = \frac{8}{100} \qquad \frac{3}{30} = \frac{1}{10}$$
$$= 8\% \qquad = \frac{10}{100}$$
$$= 10\%$$

The better goalie allows fewer goals.

$8\% < 10\%$

So, Shanna is the better goalie. **(5 marks)**

2. **Wayman** **Gilles**

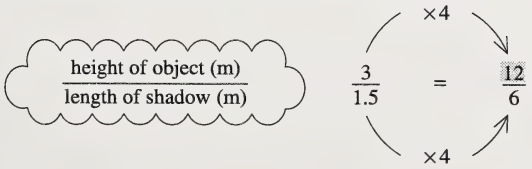
$$\frac{5}{12} = 0.417 \qquad \frac{4}{10} = 0.4$$

The better player makes more free throws.

$0.417 > 0.4$

So, Wayman is better at free throws. **(5 marks)**

3.

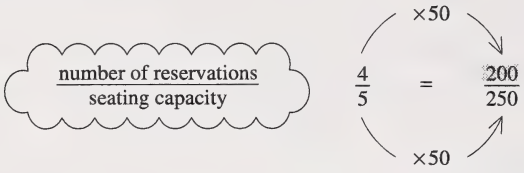


The tree is 12 m high. **(5 marks)**

4. **Step 1:** Write the percent as a ratio in simplest form.

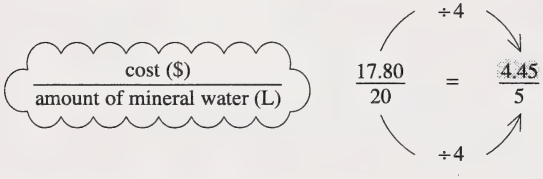
$$80\% = \frac{80}{100}$$
$$= \frac{4}{5}$$

Step 2: Write a proportion and find the missing term.



So, 200 reservations were made. **(5 marks)**

5.



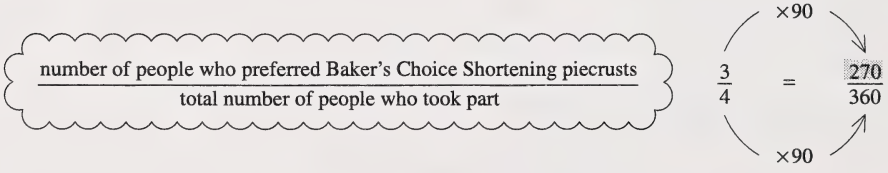
So, 5 L of the water costs $4.45. **(5 marks)**

Final Module Assignment Answer Key (25 marks)

1. **a.** The ratio of the number of people who prefer Baker's Choice Shortening piecrusts to the number of people who prefer piecrusts made with other shortenings is 3 to 1.

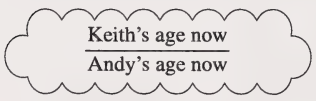
So, the ratio of the number of people who prefer Baker's Choice Shortening piecrusts to the total number of people surveyed is 3 to 4. **(2 marks)**

b.



So, in the tests, 270 people preferred Baker's Choice Shortening piecrusts. **(2 marks)**

2. **a.**



$$\frac{2}{14} = \frac{1}{7}$$

The ratio of Keith's age now to Andy's age now is 1:7. **(2 marks)**

b. If Keith is 2 years old now, in one year he will be 3. If Andy is 14 years old now, in one year he will be 15.

$$\frac{\text{Keith's age in one year}}{\text{Andy's age in one year}} \qquad \frac{3}{15} = \frac{1}{5}$$

The ratio of Keith's age in one year to Andy's age in one year is $1:5$. **(2 marks)**

c. If Keith is 2 years old now, one year ago he was 1. If Andy is 14 years old now, one year ago he was 13.

$$\frac{\text{Keith's age one year ago}}{\text{Andy's age one year ago}} \qquad \frac{1}{13}$$

The ratio of Keith's age one year ago to Andy's age one year ago is $1:13$. **(2 marks)**

d. Use the guess, check, and revise strategy to solve this problem.

Step 1: Find the ages that give a ratio of 1 to 2.

In one year Keith will be 3 and Andy will be 15. In two years Keith will be 4 and Andy will be 16. In three years Keith will be 5 and Andy will be 17. Continue this sequence until the ratio of the ages is 1 to 2.

$$\frac{3}{15} \neq \frac{1}{2} \qquad \frac{4}{16} \neq \frac{1}{2} \qquad \frac{5}{17} \neq \frac{1}{2} \qquad \frac{6}{18} \neq \frac{1}{2} \qquad \frac{7}{19} \neq \frac{1}{2}$$

$$\frac{8}{20} \neq \frac{1}{2} \qquad \frac{9}{21} \neq \frac{1}{2} \qquad \frac{10}{22} \neq \frac{1}{2} \qquad \frac{11}{23} \neq \frac{1}{2} \qquad \frac{12}{24} = \frac{1}{2}$$

So, Keith will be 12 and Andy will be 24 when the ratio of Keith's age to Andy's age is 1 to 2.

Step 2: Find the number of years needed to reach the ratio of 1 to 2.

Keith is now 2 years old. Andy is now 14 years old.

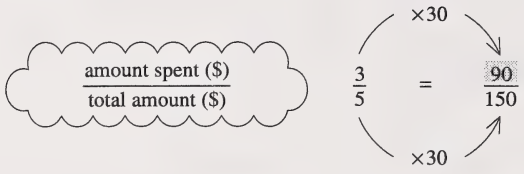
$$12 - 2 = 10$$
$$24 - 14 = 10$$

It will be 10 years until the ratio of Keith's age to Andy's age is 1 to 2. **(2 marks)**

3. a. **Step 1:** Write 60% as a ratio in simplest form.

$$60\% = \frac{60}{100}$$
$$= \frac{3}{5}$$

Step 2: Write a proportion and find the missing term.



Nadine spent $90. **(2 marks)**

b. **Step 1:** Find the amount remaining after Nadine spent $90.

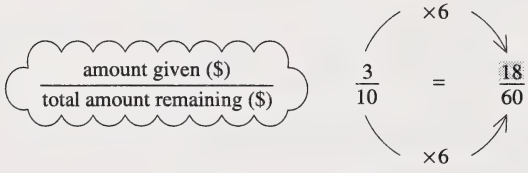
$$150 - 90 = 60$$

So, there is $60 remaining.

Step 2: Write 30% as a ratio in simplest form.

$$30\% = \frac{30}{100}$$
$$= \frac{3}{10}$$

Step 3: Write a proportion and find the missing term.



Nadine gave her mother $18. **(2 marks)**

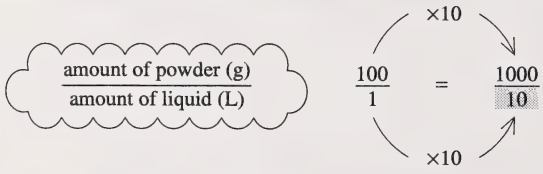
c. $60 - 18 = 42$

Nadine put $42 in the bank. **(2 marks)**

4. **a.** **Step 1:** Convert 1 kilogram to grams.

$$1 \text{ kg} = 1000 \text{ g}$$

Step 2: Write a proportion and find the missing term.



So, 10 L of liquid milk can be made from a 1-kg box of powdered milk. **(2 marks)**

b. **Step 1:** Find the amount of milk needed in one year in litres.

$$\begin{array}{r} 365 \\ \times\ \ 2 \\ \hline 730 \end{array}$$

365 days = 1 year

So, 730 L of milk are needed for 1 year.

Step 2: Write a proportion and find the missing term. **Note:** Each 1-kg box of powdered milk makes 10 L of liquid milk.

$$\frac{\text{amount of liquid (L)}}{\text{number of boxes}} \qquad \frac{10}{1} \overset{\times 73}{=} \frac{730}{73}$$

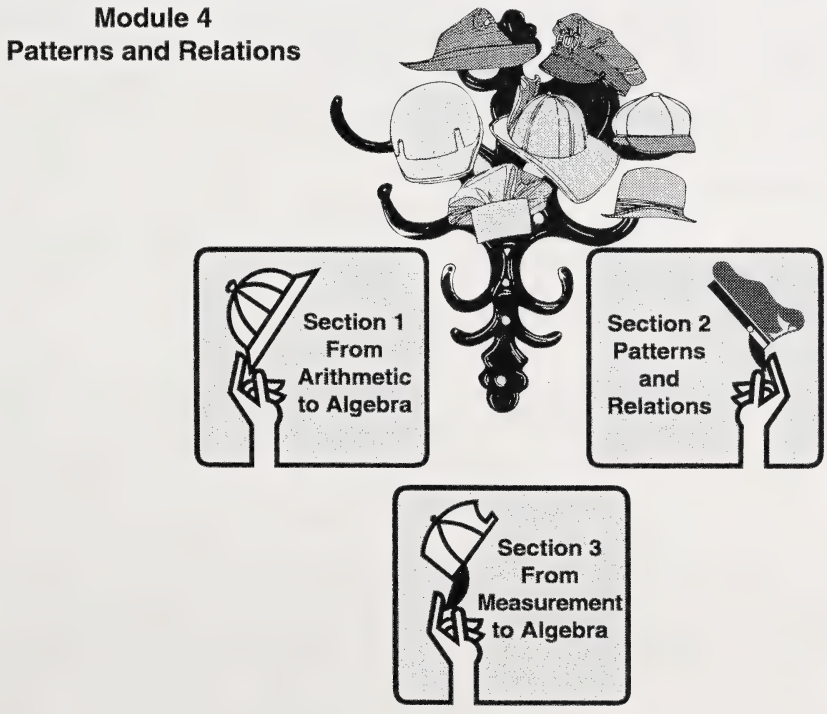
So, 73 boxes of powdered milk are needed. **(3 marks)**

5. Jody assumed that each egg must be cooked separately. You can cook four eggs together. So, the time would be much less than 12 min. **(2 marks)**

Module 4: Patterns and Relations

Overview

In Module 4 students will discover that algebra is a generalization of arithmetic and that algebra is a valuable tool that everyone needs.



Evaluation

The evaluation of this module will be based on four assignments:

Section 1 Assignment	**30 marks**
Section 2 Assignment	**25 marks**
Section 3 Assignment	**25 marks**
Final Module Assignment	**20 marks**
TOTAL	**100 marks**

Section 1: From Arithmetic to Algebra

Key Concepts

- order of operations
- variable expressions
- equations

The basic goals of this section are to ensure that students can evaluate mathematical expressions using the rules for the order of operations, evaluate variable expressions for given values of the variable, translate mathematical expressions and variable expressions, and solve conditional equations by inspection or using the guess, check, and revise strategy.

Gathering Materials

Students will need a scientific calculator.

Students who wish to do the Extra Help will need the cut-out tiles provided in the Appendix of the Student Module Booklet. (You may wish to photocopy the page of tiles so that students may cut out these learning aids. The page can be glued to heavier paper or laminated first; this will make the tiles easier to handle.)

Students who wish to do the Enrichment will require a computer and a spreadsheet program such as *ClarisWorks*™. (You may wish to do a search of "ClarisWorks" on the Internet. There are a number of sites providing demonstrations, up-to-date program information, resource information, as well as programs available for downloading. Students may enjoy exploring some of these sites as well.)

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT.

Section 1: Assignment Answer Key (30 marks)

1. **a.** First multiply 2 and 5. Then add 3. **(2 marks)**
b. First multiply 2 and 4. Then divide 6 by 2. **(2 marks)**
c. First evaluate the third power of 2. Then subtract 2. **(2 marks)**
d. First perform the operations in the brackets; that is, add 3 and 4. Then multiply by 2. **(2 marks)**

2. **a.** $3+2\times5-1$
$=3+10-1$
$=13-1$
$=12$ **(1 mark)**

b. $2\times4-6\div2$
$=8-3$
$=5$ **(1 mark)**

c. 2^3-2+3
$=2\times2\times2-2+3$
$=8-2+3$
$=6+3$
$=9$ **(1 mark)**

d. $15-2\times(3+4)$
$=15-2\times7$
$=15-14$
$=1$ **(1 mark)**

3. Answers may vary.

a. four less than the product of five and six **(1 mark)**
b. five, times six minus four **(1 mark)**
c. eight, decreased by four divided by two **(1 mark)**
d. eight minus four, divided by two **(1 mark)**

4. a. $8-2n$ **(1 mark)** **b.** $3-n\div 5$ **(1 mark)** **c.** $3n+4$ **(1 mark)**

5. a.
$2x+1$
$=2\times 3+1$
$=6+1$
$=7$ **(2 marks)**

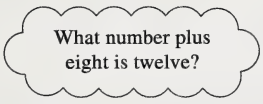
b.
$5(n+4)$
$=5(2+4)$
$=5\times 6$
$=30$ **(2 marks)**

6. a. The equal sign indicates that the value of $13+4\times 3$ is 25. **(1 mark)**

b. The equal sign indicates that $\frac{1}{3}$ and $0.\overline{3}$ are two different but equivalent ways to write the same number. **(1 mark)**

c. The equal sign indicates that the expressions $20-2\times 3$ and $81-67$ are equal in value. **(1 mark)**

7. a. $y+8=12$

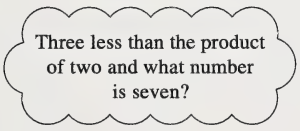


LS	RS
$y+8$	12
$=4+8$	
$=12$	

LS = RS **(2 marks)**

$\boxed{4}+8=12$
$y=4$

b. $2y-3=7$



LS	RS
$2y-3$	7
$=2\times 5-3$	
$=10-3$	
$=7$	

LS = RS **(2 marks)**

$2\times\boxed{5}-3=7$
$y=5$

Section 2: Patterns and Relations

Key Concepts

- tables
- arrow diagrams
- ordered pairs
- relation rules
- graphs

The basic goals of this section are to ensure that students can describe a relation using tables, arrow diagrams, ordered pairs, relation rules, and graphs. Students are also expected to use relation rules and graphs to make predictions about the relation.

Gathering Materials

Students will need a scientific calculator, graph paper, and a box of toothpicks.

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT.

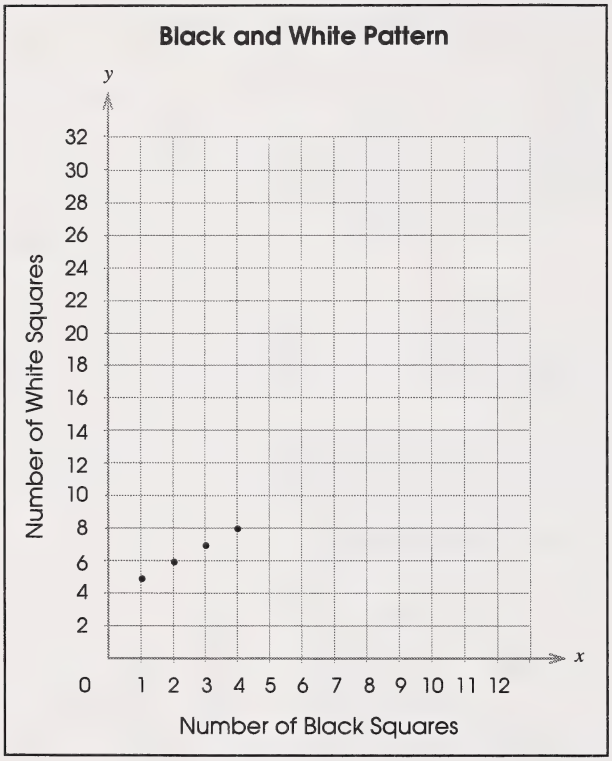
Section 2: Assignment Answer Key (25 marks)

1. a. The fifth shape will be as follows:

(2 marks)

b. A relation rule to describe the pattern is $x \longrightarrow x+4$. **(2 marks)**

c.



(2 marks)

Note: The dots are not connected because there cannot be parts of squares in the shapes.

Students may extend the pattern of dots to answer question 2.d.

Students may choose a different scale for their graph.

d. Method 1: Using the Relation Rule

If $x = 12$, then

$$x+4$$
$$=12+4$$
$$=16$$

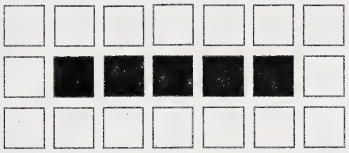
There will be 16 white squares in the shape with 12 black squares.

Method 2: Using the Graph

Students may extend the graph to include the ordered pair $(12, 16)$. So, there will be 16 white squares in the shape with 12 black squares.

(2 marks)

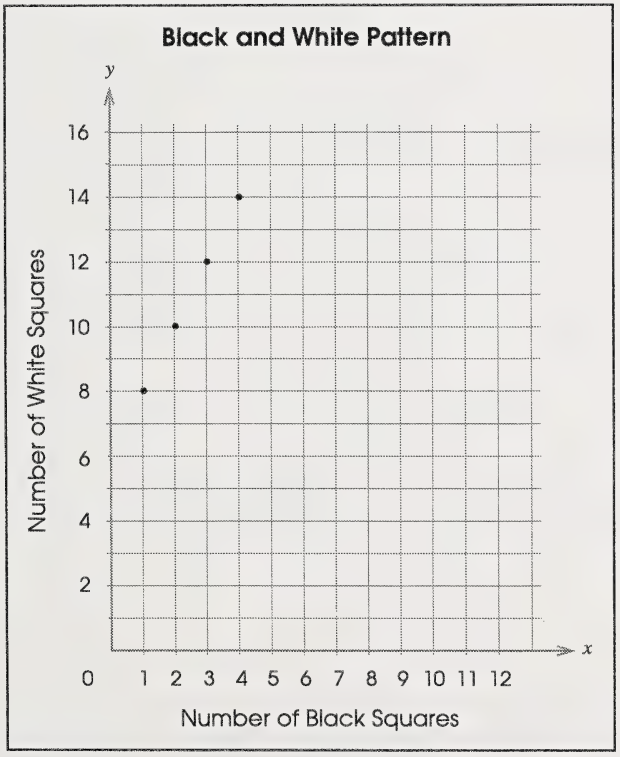
2. a. The fifth shape will be as follows:



(2 marks)

b. A relation rule to describe the pattern is $x \longrightarrow 2x+6$. **(2 marks)**

c.



(3 marks)

Note: The dots are not connected because there cannot be parts of squares in the shapes.

Students may extend the pattern of dots to answer question 3.d.

Students may choose a different scale for their graph.

d. Method 1: Using the Relation Rule

If $x = 12$, then

$$\begin{aligned} & 2x + 6 \\ &= 2 \times 12 + 6 \\ &= 24 + 6 \\ &= 30 \end{aligned}$$

There will be 30 white squares in the shape with 12 black squares.

Method 2: Using the Graph

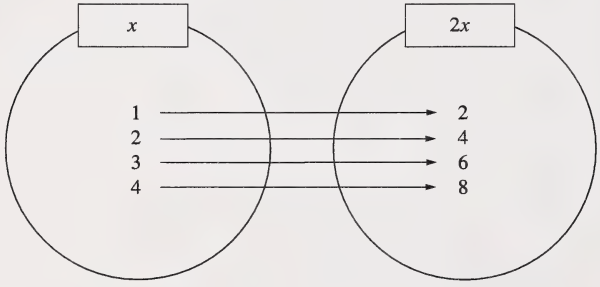
Students may extend the graph to include the ordered pair $(12, 30)$. So, there will be 30 white squares in the shape with 12 black squares.

(2 marks)

3. a. $(1,2), (2,4), (3,6), (4,8)$ **(2 marks)**

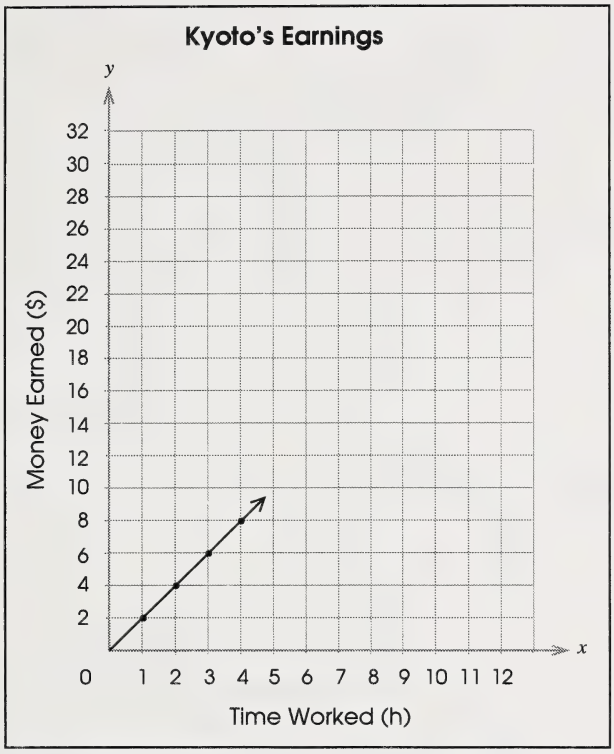
b. The relation rule is $x \longrightarrow 2x$. **(2 marks)**

c. Students may choose to label the circles in the arrow diagrams as "Time Worked" and "Money Earned," or as x and $2x$.



(2 marks)

d.



Note: The dots are connected because fractions of time and money are possible. The arrow indicates that the pattern continues.

Students may choose a different scale for their graph.

(2 marks)

Section 3: From Measurement to Algebra

Key Concepts

- perimeter of a rectangle
- area of a rectangle
- volume of a rectangular prism
- circumference of a circle

The basic goals of this section are to ensure that students can develop formulas for the perimeter of a rectangle, area of a rectangle, volume of a rectangular prism, and circumference of a circle. Students are also expected to use the formulas and to discover relationships between the length of a rectangle and its perimeter, the length of a rectangle and its area, the diameter and circumference of a circle, and so on.

Gathering Materials

Students will need a scientific calculator.

Students will also need cut-out figures for investigating perimeter. These are found in the Appendix of the Student Module Booklet. (You may wish to photocopy these pages so that students may cut out these learning aids. The pages can be glued to heavier paper or laminated first; this will make the figures easier to handle.)

Students may use base ten blocks, Unifix Cubes, or sugar cubes to investigate volume.

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT.

Section 3: Assignment Answer Key (25 marks)

1. a. $P = 2\ell + 2w$ **or** $P = 4s$ **or** $P = s_1 + s_2 + s_3 + s_4$

$= 2 \times 30 + 2 \times 30$ $= 4 \times 30$ $= 30 + 30 + 30 + 30$

$= 60 + 60$ $= 120$ $= 120$

$= 120$

The perimeter of the baseball diamond is 120 m. **(3 marks)**

b. $A = \ell w$ **or** $A = s^2$

$= 30 \times 30$ $= 30^2$

$= 900$ $= 900$

The area of the baseball diamond is 900 m^2. **(3 marks)**

2. a. $P = 2\ell + 2w$

$= 2 \times 5.5 + 2 \times 3.5$

$= 11 + 7$

$= 18$

The perimeter is 18 m. **(3 marks)**

b. $A = \ell w$

$= 5.5 \times 3.5$

$= 19.25$

$\doteq 19.3$

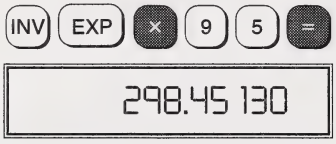
The area of the flower bed is about 19.3 m^2. **(3 marks)**

3. $C = \pi d$ **or**

$\doteq 3.14 \times 95$

$\doteq 298.3$

$\doteq 298$



Note: The 2nd F key could be used instead of the INV key.

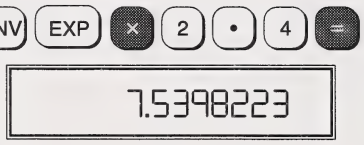
The circumference is about 298 m. **(3 marks)**

4. $C = \pi d$ **or**

$\doteq 3.14 \times 2.4$

$\doteq 7.536$

$\doteq 7.5$



Note: The 2nd F key could be used instead of the INV key.

The circumference is about 7.5 m. **(3 marks)**

5. $V = \ell wh$

$= 14 \times 6 \times 20$

$= 1680$

The box holds 1680 cm^3. **(3 marks)**

6. $V = \ell wh$

$= 0.5 \times 0.6 \times 1$

$= 0.3$

The volume is $0.3\ \text{m}^3$. **(3 marks)**

7. $\frac{C}{d} = \pi$

The ratio of the circumference to the diameter of any circle is π (about 3.14). **(1 mark)**

Final Module Assignment Answer Key (20 marks)

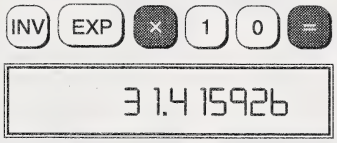
1. **Step 1:** Find the circumference of the inner circle.

$C = \pi d$

$\doteq 3.14 \times 10$

$\doteq 31.4$

or



Note: The 2nd F key could be used instead of the INV key.

The circumference of the inner circle is about 31.4 cm.

Step 2: Find the circumference of the outer circle.

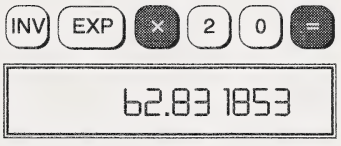
Diameter of outer circle = $10 + 5 + 5 = 20$

$C = \pi d$

$\doteq 3.14 \times 20$

$\doteq 62.8$

or



The circumference of the outer circle is about 62.8 cm.

Step 3: Find the ratio.

$\frac{\text{circumference of inner circle}}{\text{circumference of outer circle}}$

$\frac{31.4}{62.8} = \frac{314}{628}$

$= \frac{1}{2}$

The ratio of the circumference of the inner circle to the circumference of the outer circle is 1 to 2.

Note: Some students may realize that since the ratio of the diameter of the inner circle to the diameter of the outer circle is 1 to 2, the ratio of the circumference of the inner circle to circumference of the outer circle is also 1 to 2. **(2 marks)**

2. **a.** You can find the cost by multiplying the number of toppings by \$0.50 and adding \$6. **(2 marks)**

b. Let n be the number of toppings.
Let C be the cost.

$C = 6 + 0.50n$ **(2 marks)**

c. $C = 6 + 0.50n$

$9 = 6 + 0.50n$

What number multiplied by 0.50 and added to 6 results in 9?

LS	RS
$6 + 0.50n$	9
$= 6 + 0.5 \times 6$	
$= 6 + 3$	
$= 9$	

LS = RS

$9 = 6 + 0.50 \times \boxed{6}$

$n = 6$

There are 6 toppings on a \$9 medium pizza. **(3 marks)**

3. Students may solve the problem using a guess, check, and revise strategy.

$3 + (54 - 36) \div 6 = 6$ **(3 marks)**

4. Let t be the temperature.
Let n be the number of cricket chirps.
So, $t = n \div 8 + 5$.

If $n = 96$, then

$t = n \div 8 + 5$
$= 96 \div 8 + 5$
$= 12 + 5$
$= 17$

The temperature is 17°C. **(4 marks)**

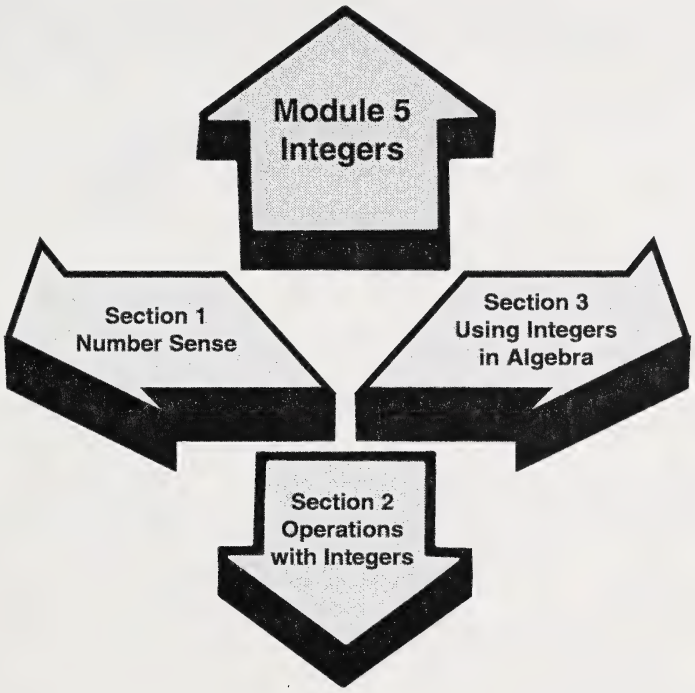
5. Students may solve the problem using a guess, check, and revise strategy.

The length is 30 m and the width is 15 m. **(4 marks)**

Module 5: Integers

Overview

In Module 5 students will increase their number sense and operation sense by studying integers. They will discover situations that can be represented by integers. They will compare and order integers, perform operations with integers, and use integers in algebra.



Evaluation

The evaluation of this module will be based on four assignments:

Section 1 Assignment	**25 marks**
Section 2 Assignment	**35 marks**
Section 3 Assignment	**20 marks**
Final Module Assignment	**20 marks**
TOTAL	**100 marks**

Section 1: Number Sense

Key Concepts

- integers
- absolute value
- opposite integers

The basic goals of this section are that students can represent situations with integers, compare and order integers, and model integers with two-coloured counters.

Gathering Materials

Students will need a videocassette player, the video program *Integers* from the series *Math Moves*, and counters. You may wish to photocopy the pages of counters in the Appendix of the Student Module Booklet so that students may cut out these learning aids. The pages can be glued to heavier paper or laminated first; this will make the counters easier to handle. Alternatively, students may use counters of two colours such as bingo chips or checkers.)

Students who wish to do the Extra Help will require a compass to construct number lines. If students wish to play the game "Integer War," they will also need the cards provided in the Appendix of the Student Module Booklet. (You may wish to photocopy the pages of cards so that students may cut out these learning aids. The pages can be glued to heavier paper or laminated first; this will make the cards easier to handle.)

Students who wish to do the Enrichment will need a compass to construct a time line.

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT.

Section 1: Assignment Answer Key (25 marks)

1. **a.** -50 **(2 marks)** **b.** $+8$ **(2 marks)** **c.** -25 **(2 marks)** **d.** $+5$ **(2 marks)**

2. **a.** In this statement, zero means no errors. **(2 marks)**

b. In this statement, zero is the starting place on the thermometer (the freezing point of water). Temperatures above 0°C are warmer. Temperatures below 0°C are colder. **(2 marks)**

3. **a.** Helium has the lowest melting point. **(2 marks)**
b. Bromine has the highest melting point. **(2 marks)**
c. The melting points in order from lowest to highest are -272, -259, -249, -218, -39, -7. **(4 marks)**

4. **a.** rising 10 m, $+10$ **(2 marks)** **b.** withdrawing \$25, -25 **(2 marks)**

5. They have the same absolute value. **(1 mark)**

Section 2: Operations with Integers

Key Concepts

- modelling operations
- calculator sign-change key
- mental computation
- order of operations

It is very important that students have both a conceptual and procedural understanding of operations with integers. Therefore, the goals are that students use models to visualize operations with integers and to discover patterns in operations with integers that they can apply, compute operations with integers mentally and using a calculator, and use integers in a problem-solving setting.

Gathering Materials

Students will need a scientific calculator. Students will continue to use the video program *Integers* from the series *Math Moves*, and the learning aids used in Section 1.

Students who wish to do the Extra Help will need the page of cut-out Droopy figures from the Appendix in the Student Module Booklet. (You may wish to photocopy the page of figures so that students may cut out these learning aids. The page can be glued to heavier paper or laminated first; this will make the figures easier to handle.)

If students wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT.

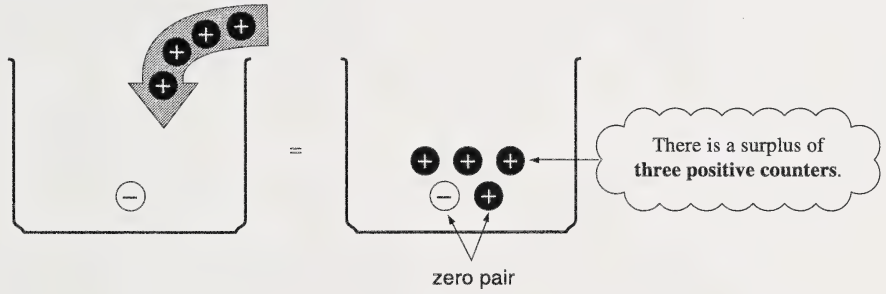
Section 2: Assignment Answer Key (35 marks)

1. a. $(-1)+(+4)=+3$

Eugene's score was 3 over par. **(2 marks)**

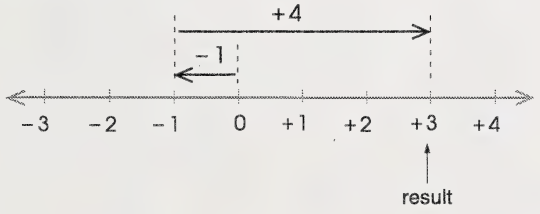
b. Students may draw diagrams of the counter model or the number-line model.

- The counter model should show four positive counters being added to a container with one negative counter. After rearranging the counters to show the zero pairs, the result is a surplus of three positive counters.



$\therefore (-1)+(+4)=+3$

- The number-line model should look like this.



$\therefore (-1)+(+4)=+3$
(2 marks)

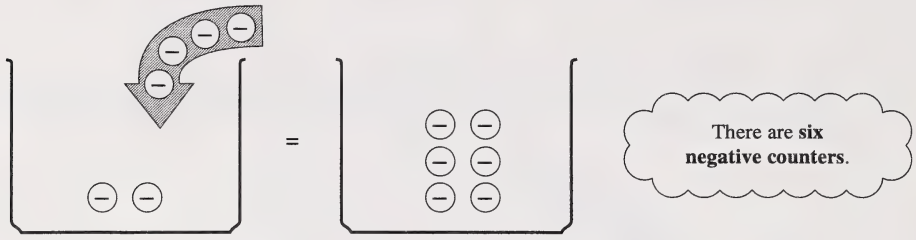
2. a.

$$\begin{array}{r} (-2) \\ +\ (-4) \\ \hline -6 \end{array}$$

Frank's plus-minus rating was -6. **(2 marks)**

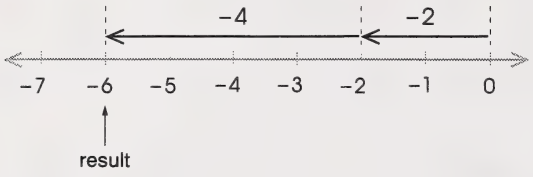
b. Students may draw diagrams of the counter model or the number-line model.

- The counter model should show four negative counters being added to a container with two negative counters. The result is a total of six negative counters in the container.



$\therefore\ (-2)+(-4)=-6$

- The number-line model should look like this.



$\therefore\ (-2)+(-4)=-6$

(2 marks)

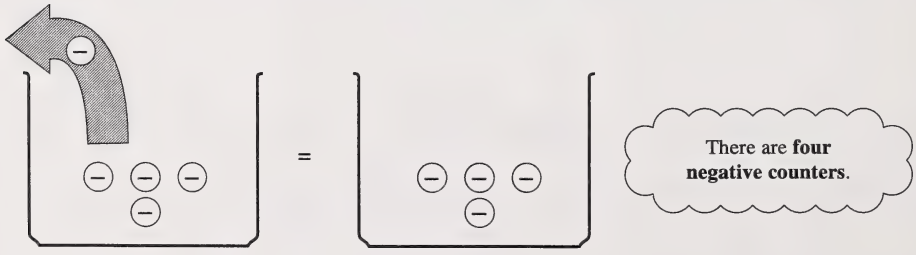
3. a. $(-5)-(-1)=(-5)+(+1)$

$=-4$

Wanda's score decreased by 4 strokes. Her score improved. **(2 marks)**

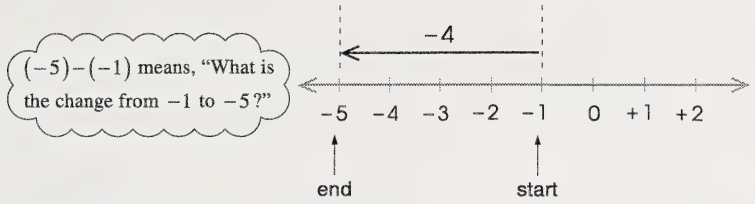
b. Students may use a counter model or a number-line model.

- The counter model should show one negative counter being removed from a container having five negative counters. The result is four negative counters in the container.



$\therefore\ (-5)-(-1)=-4$

- The number-line model should look like this.



$\therefore\ (-5)-(-1)=-4$

(2 marks)

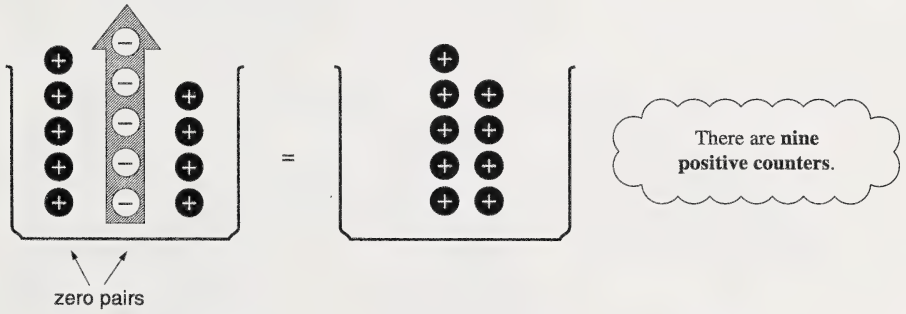
4. **a.**

$$\begin{array}{rcl} (+4) & = & (+4) \\ -\ (-5) & = & +\ (+5) \\ \hline & & +9 \end{array}$$

The temperature rose 9°C. **(2 marks)**

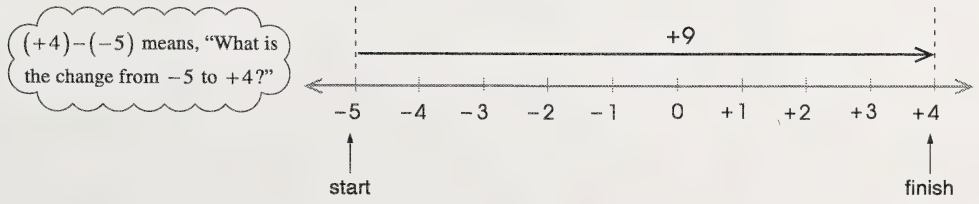
b. Students may use a counter model or a number-line model.

- The counter model should show five negative counters being removed from a container having four positive counters and five zero pairs. The result is nine positive counters in the container.



$\therefore\ (+4)-(-5)=+9$

- The number line should look like this.



$\therefore\ (+4)-(-5)=+9$

(2 marks)

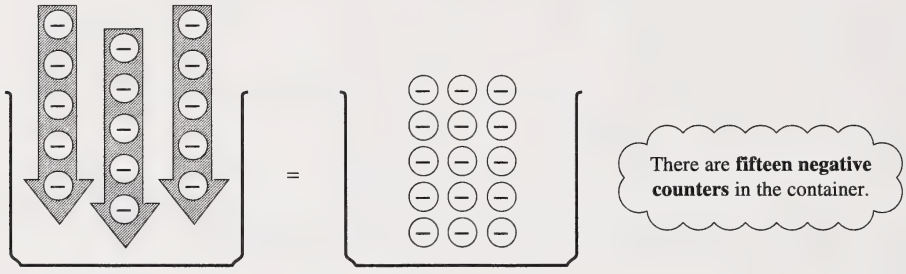
5. a. $(+3)\times(-5)=-15$

The amount of water will decrease by 15 L. **(2 marks)**

b. Students may use either of the counter models, or they may use a number-line model.

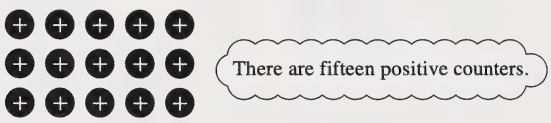
- The counter model should show three groups of five negative counters being put in the container; the result is 15 negative counters.

$(+3)\times(-5)$ can mean, "What is the result if three groups of five negative counters are put into the container?"

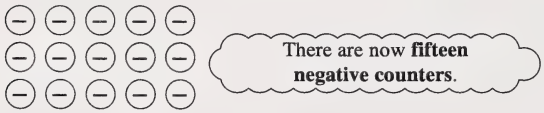


$\therefore\ (+3)\times(-5)=-15$

- The expression $(+3)\times(+5)$ can be shown as a rectangular array.

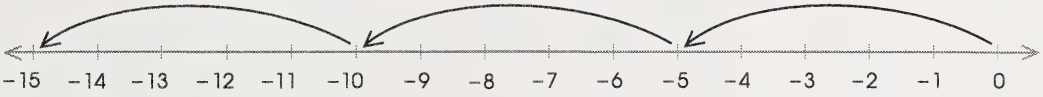


There is **one** negative factor in the expression $(+3)\times(-5)$ so exchange the counters for their opposites **once**.



$\therefore\ (+3)\times(-5)=-15$

- Students should explain that they placed the Droopy wearing the positive sweater at zero on the number line. Droopy faced the positive direction and moved backwards in three steps of 5.



Droopy stopped at -15.

$\therefore\ (+3)\times(-5)=-15$

(2 marks)

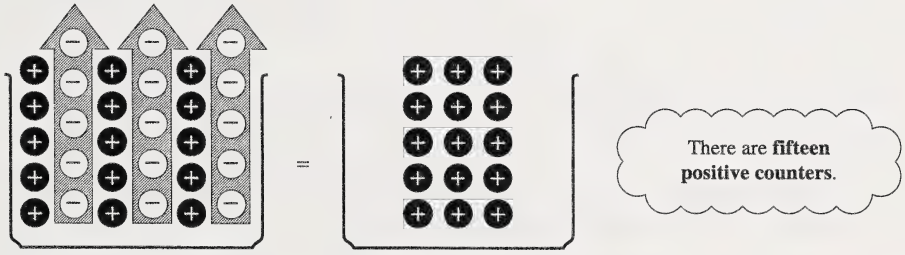
6. a. $(-3)\times(-5)=+15$

Michelle was 15 m above the water line three minutes ago. **(2 marks)**

b. Students may use either of the counter models or they may use a number-line model.

- The counter model should show three groups of five negative counters being removed from a container with fifteen zero pairs. The result is fifteen positive counters in the container.

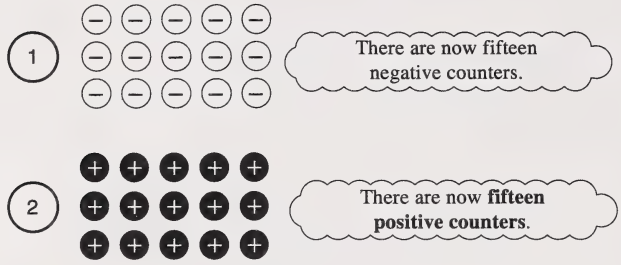
$(-3)\times(-5)$ can mean, "If three groups of five negative counters are taken out of the container, what is the result?"



$\therefore\ (-3)\times(-5)=+15$

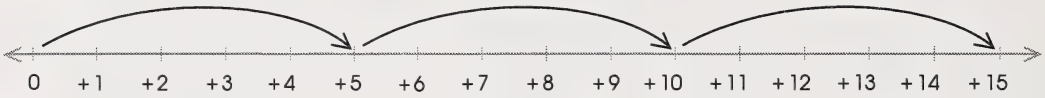
- The expression $(+3)\times(+5)$ can be shown as a rectangular array.

There are **two** negative factors in the expression $(-3)\times(-5)$. So, exchange the counters for their opposites **twice**.



$\therefore\ (-3)\times(-5)=+15$

- Students should explain that they placed the Droopy with the negative sweater at zero on the number line. Droopy faced the negative direction and moved backwards in three steps of 5.



Droopy stopped at $+15$.

$\therefore\ (-3)\times(-5)=+15$

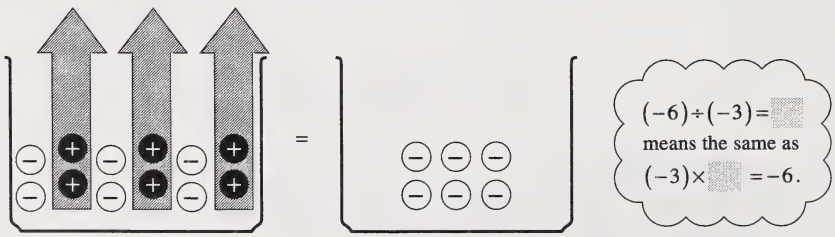
(2 marks)

7. a. $(-6)\div(-3)=+2$

It will be $-6\,°C$ in two hours. **(2 marks)**

b. Students may use a counter model or a number-line model.

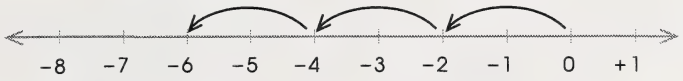
- The counter model should show three groups of two positive counters being removed from a container with six zero pairs. The result is six negative counters in the container.



Because each group has **two positive counters**, the quotient is $+2$.

$\therefore\ (-6)\div(-3)=+2$

- Students should explain that they placed the Droopy with the negative sweater at zero on the number line. Droopy faced the negative direction, moved forward in three steps of 2, and stopped at -6.



Because Droopy moved **forward** in three steps of **2**, the quotient is $+2$.

$\therefore (-6)\div(-3)=+2$

(2 marks)

$(-6)\div(-3)=$ ▒▒ means the same as $(-3)\times$ ▒▒ $=-6$.

8. a. $(-2)+(+2)\times(-3)$
$=(-2)+(-6)$
$=-8$ **(2 marks)**

b. $[(-4)+(-2)\times(-3)]\div(-2)+(+1)$
$=[(-4)+(+6)]\div(-2)+(+1)$
$=(+2)\div(-2)+(+1)$
$=(-1)+(+1)$
$=0$ **(2 marks)**

9. a. The [−] key is an operation key. It is used to subtract numbers. **(1 mark)**

b. The [+/−] key is the sign-change key. It is used to enter negative integers. **(2 marks)**

Section 3: Using Integers in Algebra

Key Concepts

- algebraic expressions
- variable
- equation
- reverse flow chart
- additive inverse (opposite integer)
- verification
- flow chart
- opposite operation

The basic goals of this section are that students can use integers to evaluate algebraic expressions and that they can systematically solve equations of the form $x+a=b$, where x is a variable and a and b are integers.

Gathering Materials

Students will need a videocassette player, the video program *Equations – Solving with One Step* from the series *Math Moves*, and the pages of cut-out learning aids provided in the Appendix of the Student Module Booklet. (You may wish to photocopy these pages so that students may cut out these learning aids. The pages can be glued to heavier paper or laminated first; this will make the learning aids easier to handle.)

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT.

Section 3: Assignment Answer Key (20 marks)

1. a. If $m=-2$, then

$$\begin{aligned}&3m-2\\&=3\times(-2)-2\\&=-6-2\\&=(-6)+(-2)\\&=-8\end{aligned}$$ **(2 marks)**

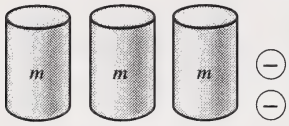
b. If $m=-1$, then

$$\begin{aligned}&3m-2\\&=3\times(-1)-2\\&=-3-2\\&=(-3)+(-2)\\&=-5\end{aligned}$$ **(2 marks)**

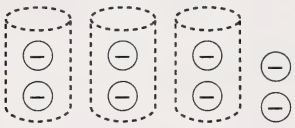
c. If $m=0$, then

$$\begin{aligned}&3m-2\\&=3\times0-2\\&=0-2\\&=0+(-2)\\&=-2\end{aligned}$$ **(2 marks)**

2. Model $3m-2$ like this.



a. If $m=-2$, replace each cylinder with two negative counters.

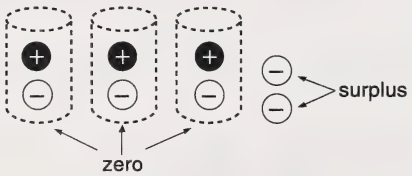


If $m=-2$, then $3m-2=-8$. **(2 marks)**

b. If $m=-1$, replace each cylinder with one negative counter.

If $m=-1$, then $3m-2=-5$. **(2 marks)**

c. If $m=0$, replace each cylinder with a zero pair.



If $m=0$, then $3m-2=-2$. **(2 marks)**

3. a. Students may solve the equation vertically or horizontally.

$$\begin{array}{rr} r+5 & =+3 \\ -5 & -5 \\ \hline r & =-2 \end{array}$$

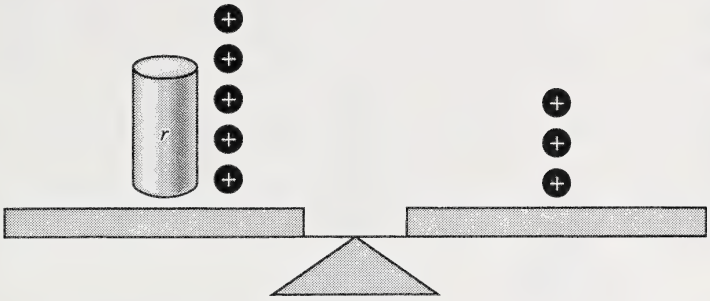
$$\begin{aligned}&r+5=3\\&r+(+5)=+3\\&r+(+5)+(-5)=(+3)+(-5)\\&r=-2\end{aligned}$$ **(2 marks)**

b.

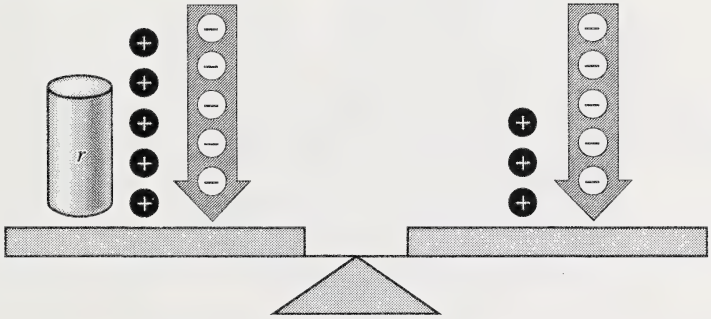
LS	RS
$r+5$	3
$=-2+5$	
$=(-2)+(+5)$	
$=3$	

LS = RS **(2 marks)**

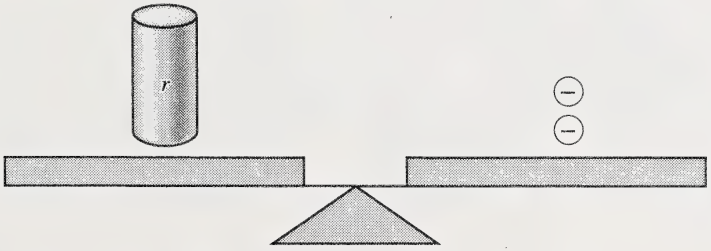
4. a. Model the equation.



To isolate r, add five negative counters to each side.

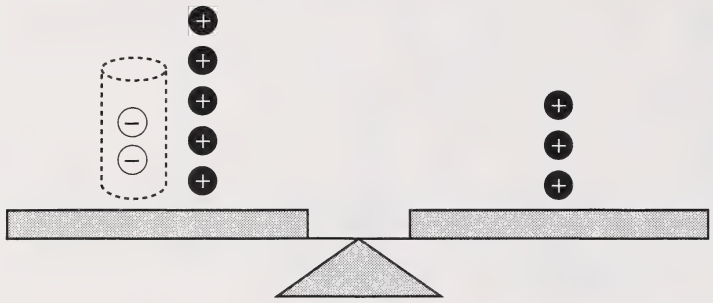


After removing the zero pairs, this is the result.

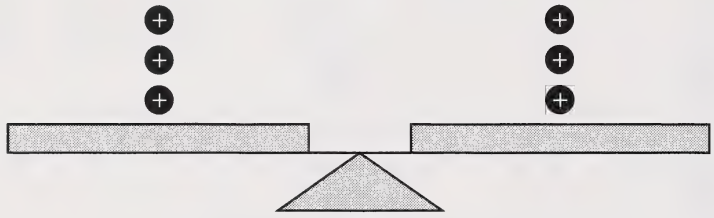


$\therefore\ r = -2$. **(2 marks)**

b. Model the equation $r+5=3$, and replace the cylinder labelled r with two negative counters.



After removing the zero pairs, this is the result.



LS = RS.

$\therefore\ r=-2$ **(2 marks)**

Final Module Assignment Answer Key (20 marks)

1. **a.** All **positive** integers are greater than 0. **(1 mark)**
b. All **negative** integers are less than 0. **(1 mark)**
c. A negative integer is **less** than any positive integer. **(1 mark)**
d. Zero is **greater** than any negative integer. **(1 mark)**
e. When you multiply two negative integers, the product is **positive**. **(1 mark)**
f. When you divide two integers with unlike signs, the quotient is **negative**. **(1 mark)**

2. $(+243)+(-315)=-72$

The Winnipeg Jets's plus-minus rating was -72. **(3 marks)**

3. $(+24)-(+39)=-15$

The stock's price decreased \$15. **(3 marks)**

4. $(-15\,000)\div(+5)=-3000$

The population change was a decline of 3000 people per year. **(3 marks)**

5. $3\times(-3000)+(-32\,000)+(+7000)+0$

$=(-9000)+(-32\,000)+(+7000)$

$=(-41\,000)+(+7000)$

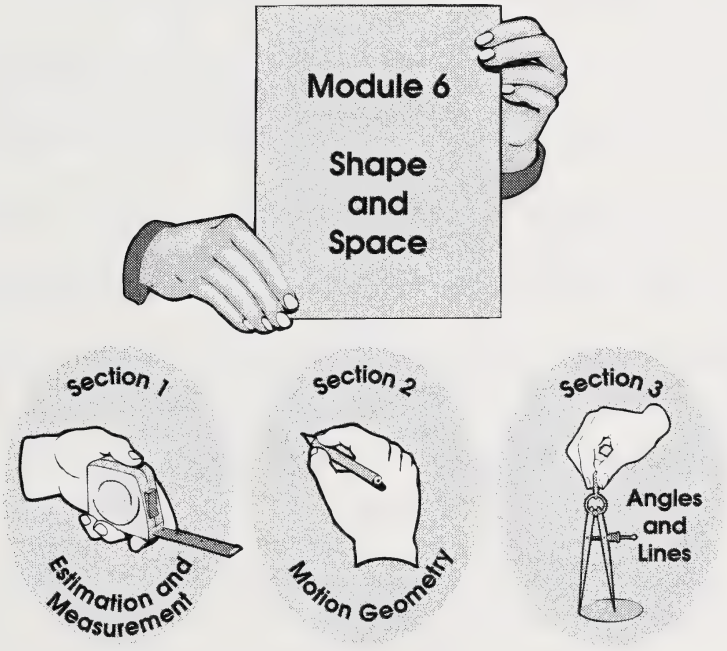
$=-34\,000$

The total population change was a decline of 34 000 people. **(5 marks)**

Module 6: Shape and Space

Overview

In Module 6 students will increase their spatial sense by studying estimation and measurement, angles and lines, and motion geometry.



Evaluation

The evaluation of this module will be based on four assignments:

Section 1 Assignment	**24 marks**
Section 2 Assignment	**22 marks**
Section 3 Assignment	**33 marks**
Final Module Assignment	**21 marks**
TOTAL	**100 marks**

Section 1: Estimation and Measurement

Key Concepts

- length
- standard time
- mass
- volume
- standard measures
- daylight saving time
- time zones
- angle
- capacity
- scientific notation

The basic goals of this section are to ensure that students can estimate and measure length, mass, capacity, and angles; are aware of different measuring tools and instruments and the level of precision that can be achieved by these tools and instruments; are aware of the need for standard measures and scientific notation; can calculate time in different time zones; and can change scientific notation to standard notation.

Gathering Materials

Students will need a mathematical instrument set (compass, metric ruler, plastic triangles, and protractor), a tailor's metric tape measure, a carpenter's metric tape measure, a 1000-cm^3 cube or the cardboard to make one, and a 1000-mL measuring cup or an empty 1-L milk carton. Students may need the following items as references for estimating length, mass, and capacity: a dime, a straight pin, a small button, a raisin, a small paper clip, a nickel, a teaspoon, and a soupspoon.

In the Student Module Booklet, students are asked to estimate the length, mass, and capacity of many everyday objects and to check their estimates by measuring the objects. To accomplish this task, students will need access to many common items and measuring tools. Students need to visit a supermarket to use the scales in the produce department. You may wish to assist students in making arrangements for this visit. (Alternatively, you could make this a homework assignment.) Students also need to visit a school laboratory to use the scientific balances.

In the Student Module Booklet, students are asked to calculate the time and day in different time zones. If a globe is unavailable at home, students may need to visit a library or classroom that has a globe.

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT.

Note: In the Assignment Booklet, students are asked to visit businesses, sporting clubs, or service groups in their community to find out how people use measurement. Students are expected to write a report on their findings. You may wish to help students make the arrangements for these visits.

Section 1: Assignment Answer Key (24 marks)

1. **a.** B **(1 mark)** **b.** D **(1 mark)** **c.** D **(1 mark)**

2. **a.** 25° **(2 marks)** **b.** 155° **(2 marks)** **c.** 90° **(2 marks)** **d.** 50° **(2 marks)**

3. Considerations have been given for borders (national, provincial, and state), for groups of islands, and for political affiliations. **(2 marks)**

4. The time in Charlottetown is 2 h more than the time in Winnipeg.

$$\begin{array}{r} 14:00 \\ +\ \ 2 \\ \hline 16:00 \end{array}$$

So, it is 16:00 (4 P.M.) in Charlottetown. **(2 marks)**

5. **a.** The time in Sydney, Australia, is 18 h more than the time in Los Angeles.

$$\begin{array}{r} 08:00 \\ +\ 18 \\ \hline 26:00 = 02:00 \end{array}$$

Regrouping is required; 26:00 on Tuesday is the same as 02:00 on Wednesday.

So, when it is 08:00 on Tuesday in Los Angeles, it is 02:00 on Wednesday in Sydney. **(3 marks)**

b. The non-stop flight leaves at 02:00 Australian time and arrives at 16:00 Australian time.

$$\begin{array}{r} 16:00 \\ -\ 02:00 \\ \hline 14 \end{array}$$

So, the flying time is 14 h. **(3 marks)**

6. $5.4 \times 10^{11} = 540\ 000\ 000\ 000$

So, the national debt of Canada in January 1995 was $540 000 000 000. **(3 marks)**

Section 2: Motion Geometry

Key Concepts

- slides
- flips
- turns
- symmetry
- lines of symmetry
- turn order

The basic goals of this section are to ensure that students can visualize slides, flips, and turns; recognize symmetrical designs; and make their own designs.

Gathering Materials

Students will need graph paper, tracing paper, heavy paper (card stock), scissors, masking tape, tacks, and coloured felt pens or coloured pencils.

Students will need a videocassette player and the video *Tessellations* from the series *Math Vantage*.

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT.

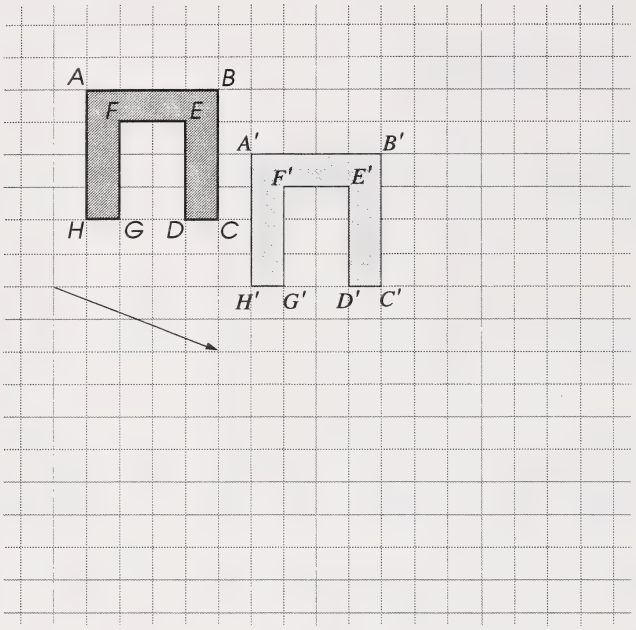
Students who wish to do the computer activity will need the computer program *TesselMania!*™ from MECC.

Students who wish to do the Extra Help will need a mira. Miras are available from suppliers of educational materials. (Alternatively, students could use rectangular pieces of plexiglass.)

Students who wish to do the Enrichment will need two small identical rectangular mirrors. You may also wish to provide the students with a kaleidoscope. Mirrors and kaleidoscopes are available from suppliers of educational materials.

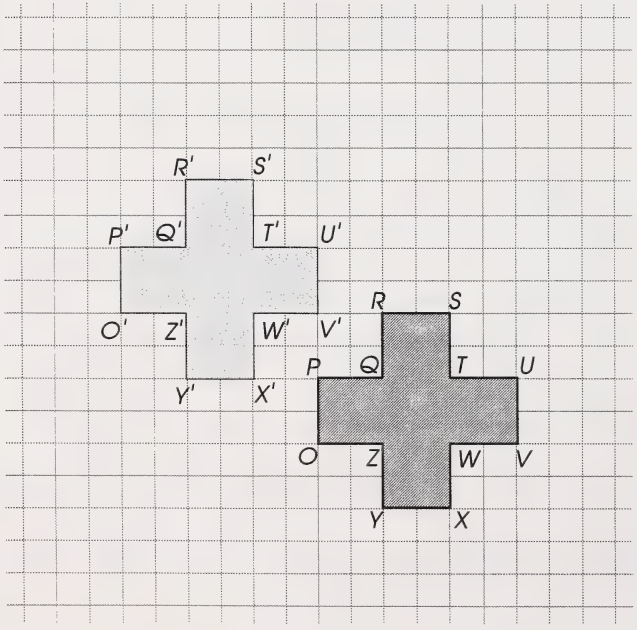
Section 2: Assignment Answer Key (22 marks)

1.



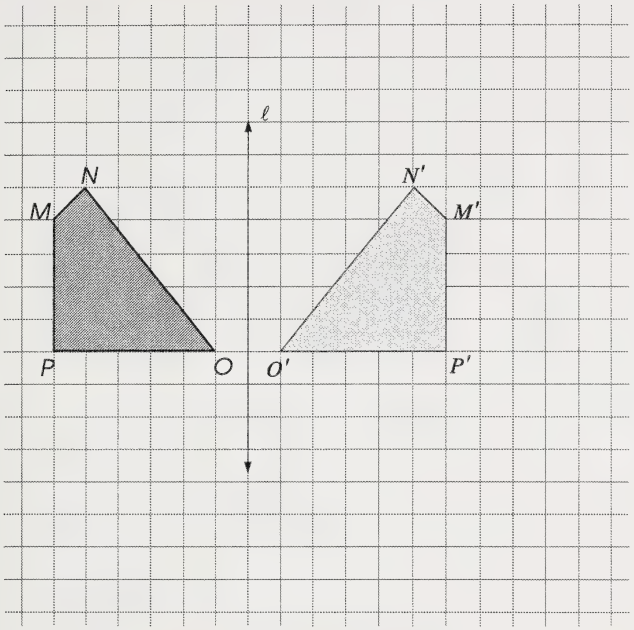
(3 marks)

2. The slide rule is **(Left 6, Up 4)** or (L6, U4).



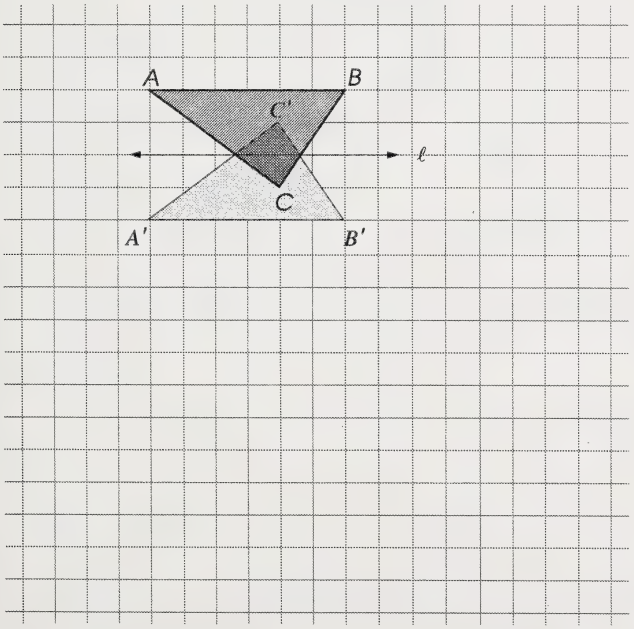
(3 marks)

3.



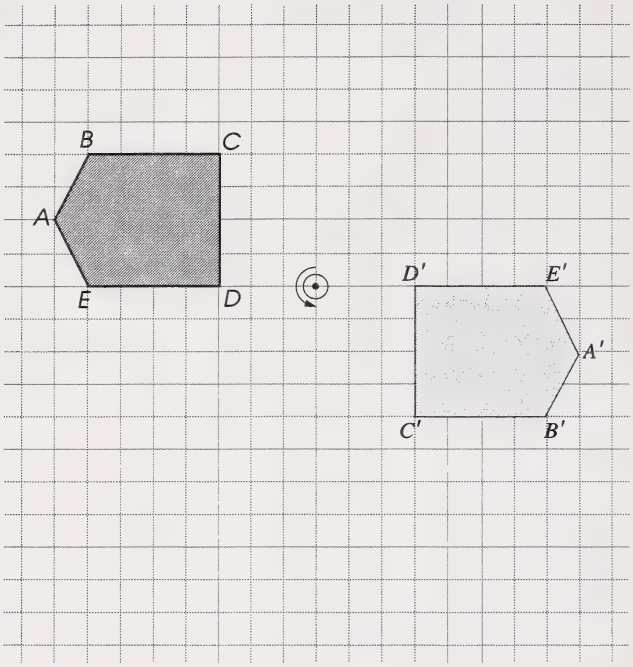
(3 marks)

4.



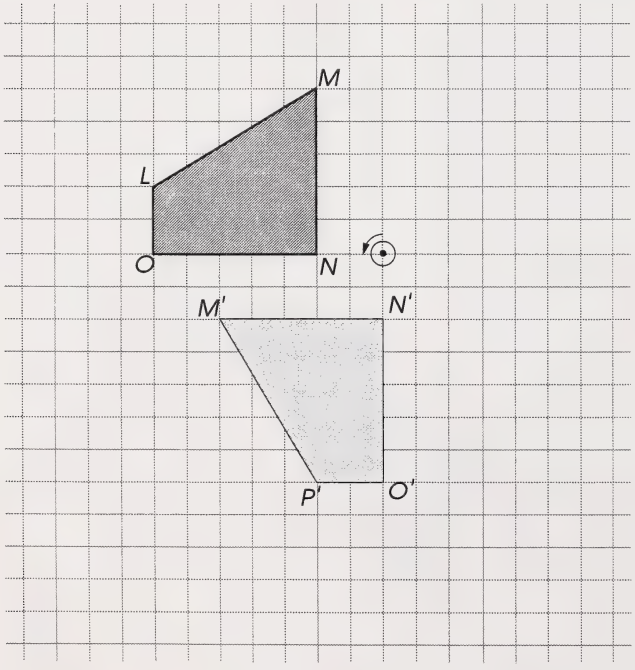
(3 marks)

5.



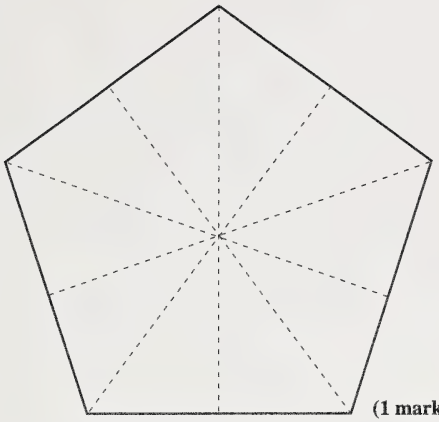
(3 marks)

6.



(3 marks)

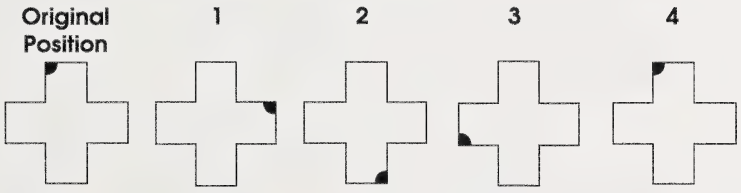
7. a.



(1 mark)

b. The shape has **5** lines of symmetry. **(1 mark)**

8. The turn order of the shape is **4** because **the shape fits onto itself 4 times**.



(2 marks)

Section 3: Angles and Lines

Key Concepts

- classifications of lines and angles
- methods of drawing angles

The basic goals of this section are to ensure that students can classify pairs of lines (intersecting, perpendicular, and parallel); angles (acute, right, obtuse, and reflex); and pairs of angles (supplementary, complementary, adjacent, vertically opposite). Students should also be able to draw angles using different methods (with a protractor, with a compass and straightedge, and with a computer).

Gathering Materials

Students will need a mathematical instrument set (compass, clear metric ruler, 30°–60°–90° triangle, 45°–45°–90° triangle, and protractor).

Students who wish to do the computer activity in the Enrichment will need a Logo computer program such as *Logo PLUS™ for the Macintosh®*, by Terrapin Software, Inc.

There are opportunities for field trips and/or guest speakers in this section. Students are asked to discover how graphic artists use traditional drafting tools to draw parallel lines. Students are also asked to discover how graphic artists use computer programs to draw angles and slide, flip, or turn figures. You may wish to identify businesses which employ graphic artists and help students make arrangements for these visits.

Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape™*, and an account with an Internet provider such as AGT.

Section 3: Assignment Answer Key (33 marks)

1. **a.** $\angle BFC$ and $\angle CFD$ are complementary angles. **(1 mark)**

b. $\angle AFB$ and $\angle BFE$ are supplementary angles. **(1 mark)**

2. **a.** $\angle 3$ and $\angle 1$ are corresponding angles. **(1 mark)**

b. $\angle 7$ and $\angle 1$ are vertically opposite angles. **(1 mark)**

c. $\angle 6$ and $\angle 3$ **or** $\angle 5$ are adjacent angles. **(1 mark)**

d. $\angle 7$ and $\angle 3$ are interior alternate angles. **(1 mark)**

e. $\angle 7$ and $\angle 6$ are co-interior angles. **(1 mark)**

f. $\angle 8$ and $\angle 4$ are exterior alternate angles. **(1 mark)**

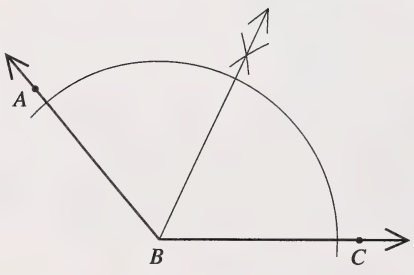
g. $\angle 8$ and $\angle 5$ are co-exterior angles. **(1 mark)**

3. Reasons may vary.

Statement	Reason
$\ell_1 \parallel \ell_2$	given
$100° + b = 180°$	The sum of supplementary angles is 180°.
$\therefore\ b = 80°$	
$c = 100°$	Corresponding angles of parallel lines are equal.
$c + d = 180°$	The sum of supplementary angles is 180°.
$100° + d = 180°$	
$\therefore\ d = 80°$	
$b = e$	Vertically opposite angles are equal.
$\therefore\ e = 80°$	
$f = 100°$	Vertically opposite angles are equal.
$g = d$	Vertically opposite angles are equal.
$\therefore\ g = 80°$	
$h = c$	Vertically opposite angles are equal.
$\therefore\ h = 100°$	

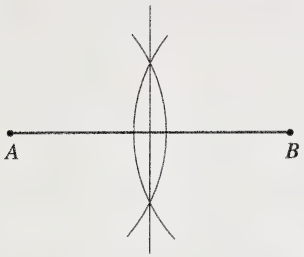
So, $b = 80°$, $c = 100°$, $d = 80°$, $e = 80°$, $f = 100°$, $g = 80°$, and $h = 100°$. **(14 marks)**

4.



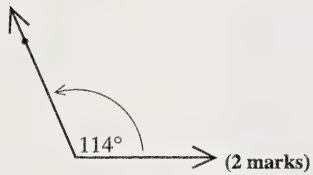
(3 marks)

5.



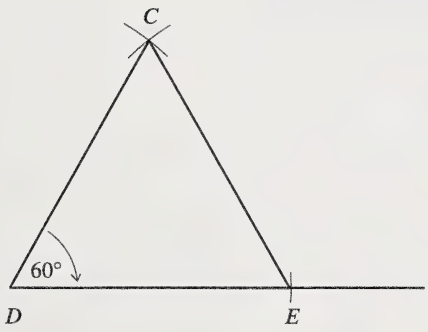
(3 marks)

6. The student's diagram should look similar to this:



(2 marks)

7.



ΔCDE is an equilateral triangle.

$\angle D = 60°$ **or** $\angle C = 60°$ **or** $\angle E = 60°$ **(2 marks)**

Final Module Assignment Answer Key (21 marks)

1. Answers will vary. Students should show evidence of the wide variety of reasons people measure, the kinds of measuring tools, and the varying degrees of accuracy required. **(15 marks)**

2. Answers will vary.

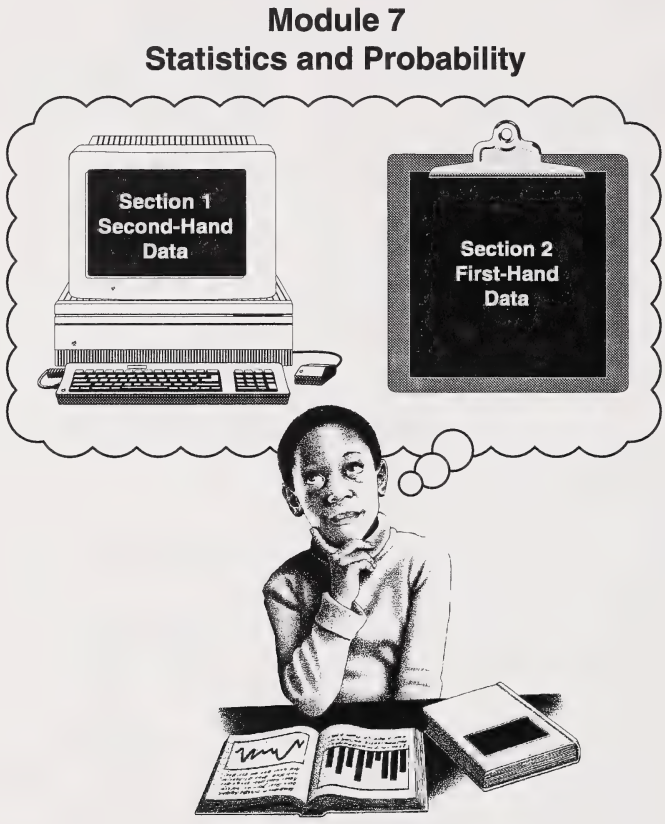
a. Students should create a design that has flip, turn, or slide symmetry. **(4 marks)**

b. Explanations should reflect a knowledge about motion geometry and its application to design. **(2 marks)**

Module 7: Statistics and Probability

Overview

In Module 7 students will increase their skills in collecting, recording, and analysing data. They will also become more skillful in making predictions. They will use both second-hand and first-hand data.



Evaluation

The evaluation of this module will be based on three assignments:

Section 1 Assignment	**50 marks**
Section 2 Assignment	**40 marks**
Final Module Assignment	**10 marks**
TOTAL	**100 marks**

Section 1: Second-Hand Data

Key Concepts

- statistics
- data
- tables
- graphs
- mean
- median
- mode
- range
- extremes
- gaps/clusters
- quartiles
- interquartile range

The basic goals of this section are to ensure that students can use appropriate research methods to collect data, can read and interpret tables and graphs, can extrapolate from data to make predictions, can determine measures of central tendency (mean, median, mode) from a set of data, and can describe the distribution (range, extremes, gaps/clusters, quartiles, interquartile range) of a set of data.

Gathering Materials

Students will need access to a library for research. Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT. Students who wish to do the spreadsheet activities will need to have access to a computer and a spreadsheet program such as *ClarisWorks*™.

Section 1: Assignment Answer Key (50 marks)

1. Answers will vary. This is an example of a possible answer:

The sources probably give different information because the measurements were made by different people or a different method of measuring was used. **(1 mark)**

2. **a.** The total amount of income tax collected in 1992 was $122 041.0 million or $122 041 000 000. **(2 marks)**

b. In 1992, individuals paid 92% of the income tax collected. **(2 marks)**

c. In 1992, corporations paid 8% of the income tax collected. **(2 marks)**

d. Between 1950 and 1992, the percent of the total amount of income tax collected from individuals increased. (It rose from 48% to 92%.) **(2 marks)**

3. Answers may vary slightly.

a. Canada received about 250 000 immigrants in 1992. **(2 marks)**
b. According to the graph, Canada had its greatest number of immigrants in 1912. **(2 marks)**
c. According to the graph, Canada had the least number of immigrants in 1940. **(2 marks)**

Note: The data provided in the graph are at four-year intervals. Actually, for the time period shown, Canada had the greatest number of immigrants in 1913, but a figure for this year was not provided.

4. Answers may vary slightly.

a. There were about 175 000 marriages in Canada in 1986. **(2 marks)**

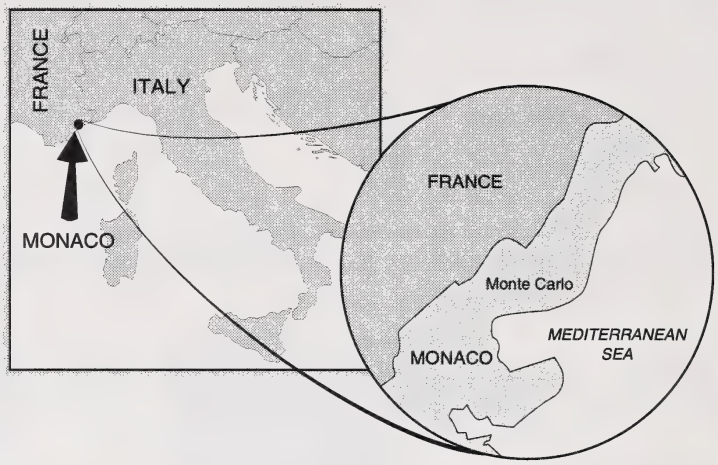
b. There were about 78 000 divorces in Canada in 1986. **(2 marks)**

c. Between 1962 and 1986, the number of divorces increased. (The yearly number of divorces rose from about 5000 to about 78 000.) **(2 marks)**

5. **a.** In 1958, the largest group of immigrants came from Europe. **(2 marks)**
b. In 1990, the largest group of immigrants came from Asia. **(2 marks)**

6. Monte Carlo is in Monaco, a small principality (Monaco has an area of about 1.9 km^2) located on the Mediterranean Sea. **(2 marks)**

Note: This is a map of Monaco.



7. **a.** Students may need to make more than one stem and leaf plot to arrange the data in order. They may also use a spreadsheet to assist them.

Stem	Leaf
3	9
4	5, 6, 6, 7, 8, 8
5	1, 2, 4, 5, 7, 9
6	0, 1, 5, 6
7	0, 0, 4

The ages from least to greatest are as follows:

39	45	46	46	47	48	48	51	52	54	
55	57	59	60	61	65	66	70	70	74	**(3 marks)**

b. Students may find a stem and leaf plot helpful in finding the gaps and clusters.

There are no ages less than 39 years or greater than 74 years. The majority of these people were in their late 40s or 50s when they became prime minister. **(2 marks)**

c. The modes of the ages at which these people became prime minister are 46, 48, and 70. **(2 marks)**

d. **Step 1:** Students should find the total of the given ages.

$$39+45+(2\times46)+47+(2\times48)+51+52+54+55+57+59+60+61+65+66+(2\times70)+74=1113$$

Step 2: Students should divide the total by the number of people.

$$1113\div20\doteq56$$

The mean age at which these people became prime minister is about 56 years. **(2 marks)**

e. Because there is an even number of values in the set of data, students should draw a line between the middle two values and then find the mean of these values.

39	45	46	46	47	48	48	51	52	54 |
55	57	59	60	61	65	66	70	70	74

$$\frac{54+55}{2} = \frac{109}{2}$$
$$= 54.5$$

The median age at which these people became prime minister is 54.5 years. **(2 marks)**

f. Students should consider only the values **less** than the median. Because there is an even number of values, students should draw a line between the middle two values and then find the mean of these values.

39	45	46	46	47 |	48	48	51	52	54 |
55	57	59	60	61	65	66	70	70	74

$$\frac{47+48}{2} = \frac{95}{2}$$
$$= 47.5$$

The lower quartile of the ages at which these people became prime minister is 47.5 years. **(2 marks)**

g. Students should consider only the values **greater** than the median. Because there is an even number of values, students should draw a line between the middle two values and then find the mean of these values.

39	45	46	46	47	48	48	51	52	54 |
55	57	59	60	61 |	65	66	70	70	74

$$\frac{61+65}{2} = \frac{126}{2}$$
$$= 63$$

The upper quartile of the ages at which these people became prime minister is 63 years. **(2 marks)**

h. The lower extreme age is 39 years. **(2 marks)**

i. The upper extreme age is 74 years. **(2 marks)**

j. Subtract the lower extreme from the upper extreme.

$$74 - 39 = 35$$

The range of the ages at which people became prime minister is 35 years. **(2 marks)**

k. Subtract the lower quartile from the upper quartile.

$$63 - 47.5 = 15.5$$

The interquartile range of the ages at which people became prime minister is 15.5 years. **(2 marks)**

Section 2: First-Hand Data

Key Concepts

- probability
- outcomes
- independent events
- Monte-Carlo simulation method

The basic goals of this section are to ensure that students can use a table, graph, or tree diagram to identify all possible outcomes of two independent events, can solve problems using the probability formula, can use the Monte-Carlo simulation method to solve probability problems, and can collect data by designing questionnaires and conducting surveys.

Gathering Materials

There are several activities in this section. Students will need a mathematical instrument set, a nickel, a dime, a thumbtack, an ordinary pencil that has six flat sides, a small paper or plastic bag, 2 paper clips, heavy paper or card stock, a plastic glass, 2 standard dice (or 2 sugar cubes or 2 small wooden cubes), and 8 ping-pong balls (or 8 styrofoam balls or 8 sugar cubes).

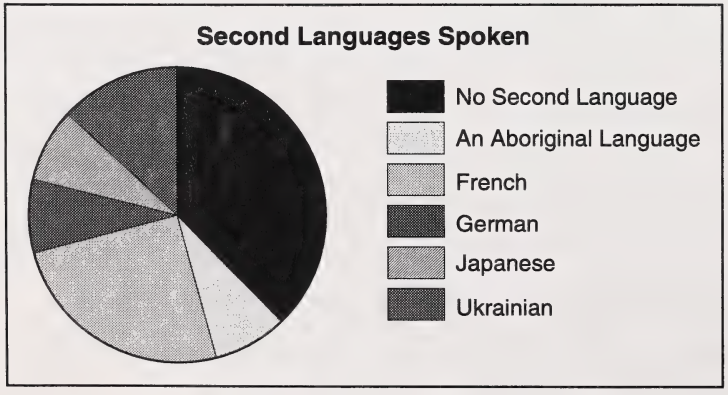
Students who wish to do the research on the Internet will need a computer, a browser such as *Netscape*™, and an account with an Internet provider such as AGT. Students who do the Extra Help or Enrichment may also need access to a computer and a spreadsheet program such as *ClarisWorks*™.

In this section students are introduced to the survey techniques of the A. C. Nielsen Company. Nielsen Media Research has a pamphlet which explains the "how" and "why" of TV ratings. You may wish to obtain the pamphlet *What TV Ratings Really Mean* by writing to the following address:

Nielsen Media Research
299 Park Avenue
New York, NY 10171
USA

Section 2: Assignment Answer Key (40 marks)

1. Students may construct the circle graph using a compass, protractor, and straightedge, or they may use a spreadsheet program.
Note: Students who construct the circle graph by hand may choose to place the appropriate label on each sector instead of using a legend.



(5 marks)

2. **a.** Let A_1 represent the first A in Alberta. Let A_2 represent the second A in Alberta.

This is the set of possible outcomes: $\{A_1, L, B, E, R, T, A_2\}$. There are 7 possible outcomes. **(2 marks)**

b. The set of favourable outcomes is $\{A_1, A_2\}$.

$$P(A) = \frac{2}{7}$$

$$\frac{\text{Number of Favourable Outcomes}}{\text{Number of Possible Outcomes}}$$

The probability of choosing a card labelled A is $\frac{2}{7}$. **(2 marks)**

c. The set of favourable outcomes is $\{L\}$.

$$P(L) = \frac{1}{7}$$

$$\frac{\text{Number of Favourable Outcomes}}{\text{Number of Possible Outcomes}}$$

The probability of choosing a card labelled L is $\frac{1}{7}$. **(2 marks)**

d. The set of favourable outcomes is $\{A_1, E, A_2\}$.

$$P(\textit{vowel}) = \frac{3}{7}$$

$$\frac{\text{Number of Favourable Outcomes}}{\text{Number of Possible Outcomes}}$$

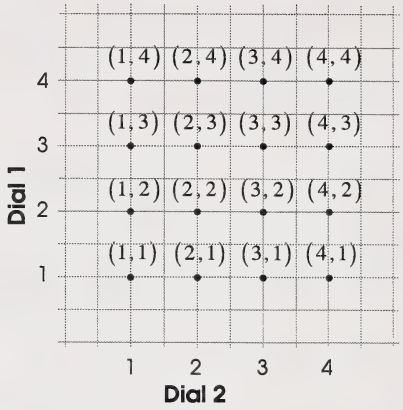
The probability of choosing a vowel is $\frac{3}{7}$. **(2 marks)**

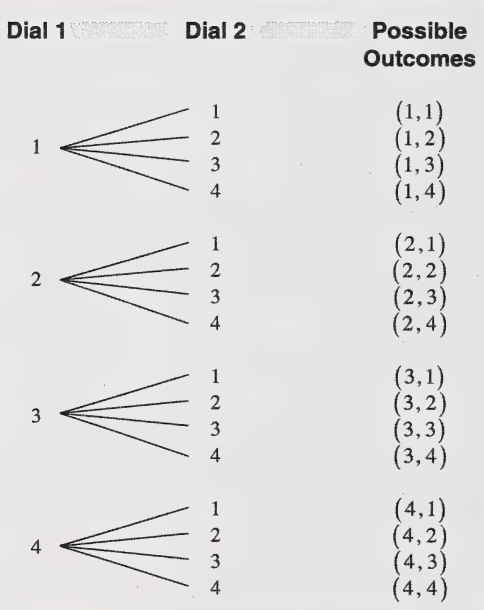
3. If the probability of an event is $\frac{7}{8}$, the event is **C** (very likely to happen).

Note: Response C should be circled. **(1 mark)**

4. a. Students can use a table, a graph, or a tree diagram to help them list the possible outcomes.

Dial 1 \ Dial 2	1	2	3	4
1	(1,1)	(1,2)	(1,3)	(1,4)
2	(2,1)	(2,2)	(2,3)	(2,4)
3	(3,1)	(3,2)	(3,3)	(3,4)
4	(4,1)	(4,2)	(4,3)	(4,4)





This is the set of possible outcomes: $\{(1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4)\}$. There are 16 possible outcomes. **(2 marks)**

b. The set of favourable outcomes is $\{(1,1)\}$.

$$P(1,1) = \frac{1}{16}$$

Number of Favourable Outcomes / Number of Possible Outcomes

The probability of each spinner landing on a 1 is $\frac{1}{16}$. **(2 marks)**

c. The set of favourable outcomes is $\{(1,3),\ (2,2),\ (3,1)\}$.

$$P(\textit{sum of } 4) = \frac{3}{16}$$

Number of Favourable Outcomes / Number of Possible Outcomes

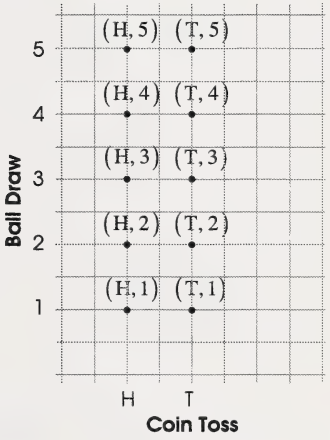
The probability of the spinners landing on numbers with a sum of 4 is $\frac{3}{16}$. **(2 marks)**

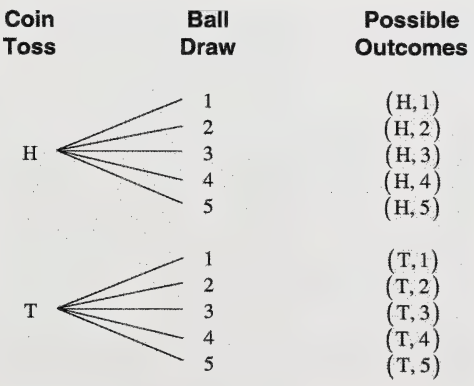
5. a. Students can use a table, a graph, or a tree diagram to list the possible outcomes.

Let H represent "Heads." Let T represent "Tails."

Ball Draw

Coin Toss	1	2	3	4	5
H	(H, 1)	(H, 2)	(H, 3)	(H, 4)	(H, 5)
T	(T, 1)	(T, 2)	(T, 3)	(T, 4)	(T, 5)





This is the set of possible outcomes: $\{(H,1),\ (H,2),\ (H,3),\ (H,4),\ (H,5),\ (T,1),\ (T,2),\ (T,3),\ (T,4),\ (T,5)\}$.
There are 10 possible outcomes. **(2 marks)**

b. The set of favourable outcomes is $\{(H,1)\}$.

$$P(H,1)=\frac{1}{10}$$

$$\frac{\text{Number of Favourable Outcomes}}{\text{Number of Possible Outcomes}}$$

The probability of flipping "Heads" and then choosing a 1 is $\frac{1}{10}$. **(2 marks)**

c. This is the set of favourable outcomes: $\{(T,2),\ (T,3),\ (T,5)\}$.

$$P(\textit{Tails and a prime})=\frac{3}{10}$$

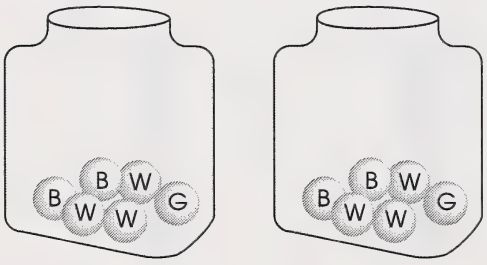
$$\frac{\text{Number of Favourable Outcomes}}{\text{Number of Possible Outcomes}}$$

The probability of flipping "Tails" and then choosing a prime number is $\frac{3}{10}$. **(2 marks)**

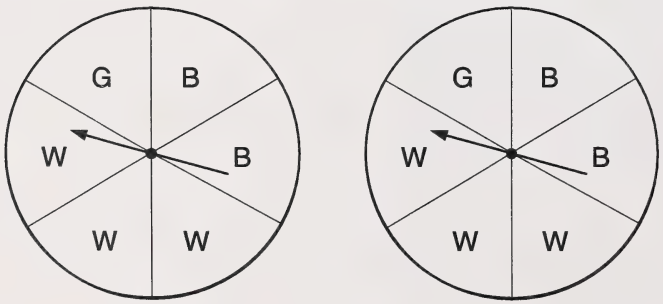
6. Students' answers will vary.

Step 1: Set up a simulation.

Students can use two sets of six balls (each set labelled identically) to represent the gloves. The students can use jars to represent the piles and put a set of balls in each jar. Students could then randomly choose balls a number of times, replacing the balls after each draw.



Alternatively, students could make two dials to represent the two piles. Each dial would have six equal sectors which represent the gloves. Students could twirl the spinners on the dials several times.



Step 2: Give the data results.

The results should be recorded in a table like this.

Event	Tally	Frequency
Two Gs		
Other		

Step 3: Calculate the experimental probability.

The students should use the relative frequency of each spinner landing on G or choosing 2 balls labelled G to calculate the probability of two grey gloves being picked.

Note: The probability of choosing two grey gloves will be low (the theoretical probability is $\frac{1}{36}$). **(4 marks)**

7. Students' answers will vary.

Step 1: Set up a simulation.

Students could let a coin toss represent the births. "Heads" (H) could represent a girl and "Tails" (T) a boy. Students could flip a coin four times in a row to simulate the births of the four children.

Step 2: Give the data results.

Repeat the simulation several times and record the results in a table like this.

Event	Tally	Frequency
Four "Heads"		
Other		

Step 3: Calculate the experimental probability.

The students should use the relative frequency of tossing four "Heads" to calculate the probability of all 4 children being girls.

Note: The probability of all the children being girls will be low (the theoretical probability is $\frac{1}{16}$). **(4 marks)**

8. a. Question 5 does not use appropriate language. The question needs to be worded more simply; everyday language should be used. **(2 marks)**

b. Question 6 is confusing. It is written in the negative; the question should be worded in the affirmative. **(2 marks)**

c. Question 7 is slanted. Words like *immature* and *mindless* are biased. The word *exposed* also has a negative implication. The wording should be neutral. **(2 marks)**

Final Module Assignment Answer Key (10 marks)

1. **a.** Students should provide an appropriate article. They should indicate the source of the article. **(2 marks)**

   b. Students should summarize the process and the results. **(2 marks)**

2. Answers will vary.

   a. Students should word their questionnaire appropriately. **(2 marks)**

   b. Students should display their results in a frequency table. **(2 marks)**

   c. Students should summarize their results. **(2 marks)**

Final Test

Security
Included here is the answer key to the Final Test and the student's copy of the Final Test. Teachers should keep these secure against unauthorized student access. Students should not have access to the test until it is assigned in a supervised situation. The answers should be stored securely and retained by the teacher at all times.

Convenience
The student's copy of the Final Test is designed for photocopying and faxing.

MATHEMATICS 7

FINAL TEST ANSWER KEY

Part 1: Number (33 marks)

1. **Note:** Students are asked to use a divisibility test to solve the problem.

80 is divisible by 4.

A number is divisible by 4 if the last two digits are divisible by 4.

So, there will be no curlers left over. **(1 mark)**

2. The least number of candies will be a multiple of 2, 3, 4, 5, and 6.

Method 1

List the multiples of each number and circle the least common multiple.

2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, (60)
3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, (60)
4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, (60)
5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, (60)
6, 12, 18, 24, 30, 36, 42, 48, 54, (60)

The least number of candies there could be is 60.

Method 2

Write the prime factorization of each number.

$2 \quad 3 \quad 4 = 2 \times 2 \quad 5 \quad 6 = 2 \times 3$

Arrange the prime factorizations so that the common prime factors are aligned in columns. To find the LCM, take one prime factor from each column and multiply.

$$\begin{aligned} 2 &= 2 \\ 3 &= \quad\quad 3 \\ 4 &= 2 \times 2 \\ 5 &= \quad\quad\quad 5 \\ 6 &= 2 \quad\quad \times 3 \end{aligned}$$

$$\text{LCM} = 2 \times 2 \times 3 \times 5 = 60$$

The least number of candies there could be is 60.
(2 marks)

3.

$\frac{\text{Number of Sheets}}{\text{Thickness (cm)}}$

$\frac{1000}{8} = \frac{250}{2}$ (÷4 on both sides)

A stack of 250 papers is 2 cm thick. **(2 marks)**

4.

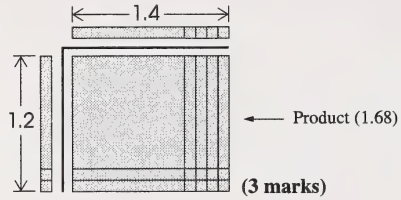
Distance (m) / Time (s)

$$\frac{238}{6} \overset{\div 6}{=} \frac{39.7}{1}$$

The ball travelled 39.7 m in 1s. **(2 marks)**

5. From the pattern, the students should predict $\frac{8}{9} = 0.\overline{8}$. **(2 marks)**

6. **a.**



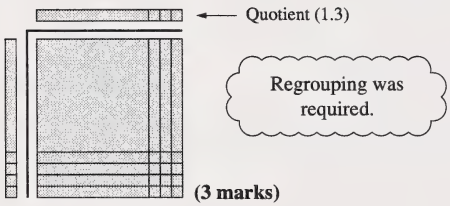
(3 marks)

b.

$$\begin{array}{r} 1.2 \\ \times\ 1.4 \\ \hline 4\,8 \\ 1\,2 \\ \hline 1.6\,8 \end{array}$$

(2 marks)

7. **a.**



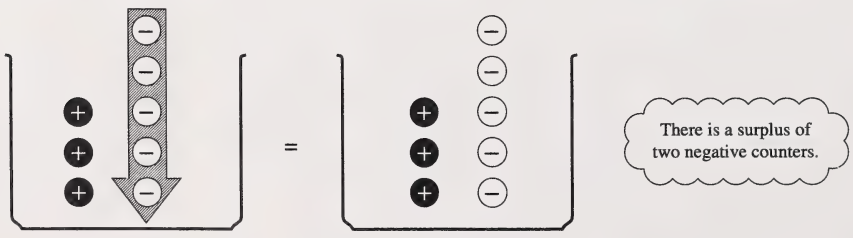
(3 marks)

b.

$$1.4\overline{)1.82}\quad \begin{array}{r} 1.3 \\ 14 \\ \hline 42 \\ 42 \\ \hline 0 \end{array} \qquad \textbf{or} \qquad 1.4\overline{)1.82}\quad \begin{array}{r} 1.3 \\ 14 \\ \hline 42 \\ 42 \\ \hline 0 \end{array} \qquad \textbf{or} \qquad 1.4\overline{)1.82} = 14\overline{)18.2}\quad \begin{array}{r} 1.3 \\ 14 \\ \hline 42 \\ 42 \\ \hline 0 \end{array}$$

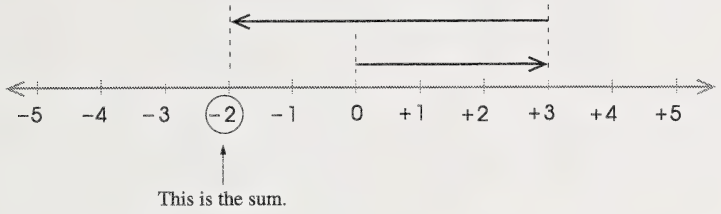
(2 marks)

8. **Method 1: Using counters**



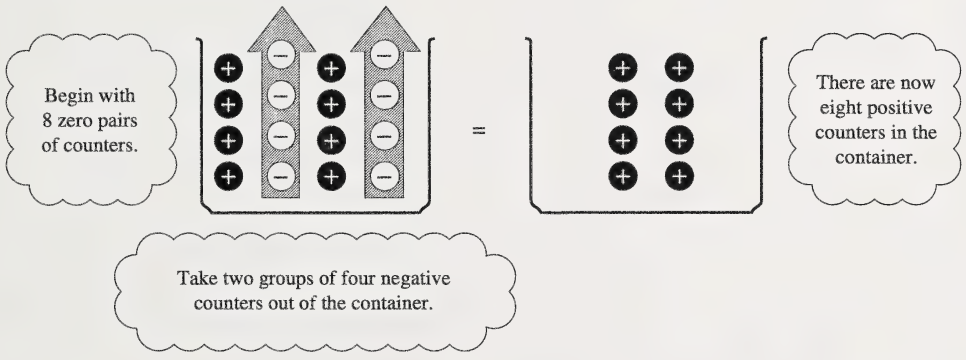
So, $(+3)+(-5)=2$.

Method 2: Using a number line



So, $(+3)+(-5)=-2$.
(3 marks)

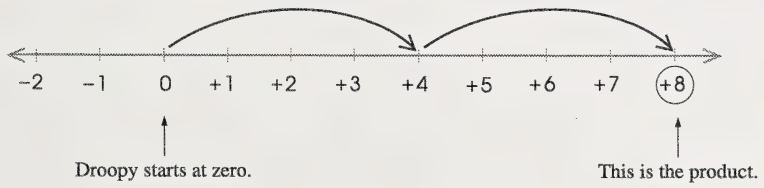
9. Method 1: Using counters


Begin with 8 zero pairs of counters.
=
There are now eight positive counters in the container.
Take two groups of four negative counters out of the container.

So, $(-2)\times(-4)=+8$.

Method 2: Using a number line

Use the Droopy wearing a negative sweater and facing in the negative direction. Droopy jumps backwards in 2 steps of 4.



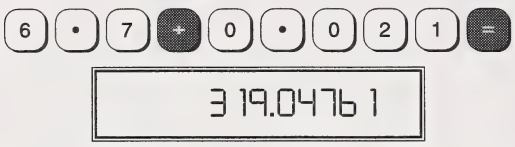
So, $(-2)\times(-4)=+8$.
(3 marks)

10. **a.** Answers will vary. The following estimate uses compatible numbers.

$$\begin{aligned} 6.7 \div 0.021 &\doteq 6 \div 0.02 \\ &\doteq 600 \div 2 \\ &\doteq 300 \end{aligned}$$

About 300 quarters will be placed end to end. **(2 marks)**

b. The following keys were pressed.



So, about 319 quarters will be placed end to end. **(2 marks)**

11. **a.** Answers will vary. The following estimates use rounding and front-end digits.

$$\begin{aligned} (+117)+(-280) &\doteq (+100)+(-300) \\ &\doteq -200 \end{aligned}$$

The temperature was about $-200\,°C$.

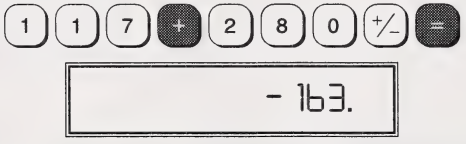
or

$$\begin{aligned} (+117)+(-280) &\doteq (+100)+(-200) \\ &\doteq -100 \end{aligned}$$

The temperature was about $-100°C$.

(2 marks)

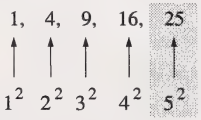
b. The following keys were pressed.



The temperature on the Moon at nightfall was $-163\,°C$. **(2 marks)**

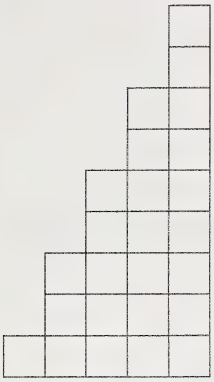
Part 2: Patterns and Relations (22 marks)

1. **a.** Find the pattern.



A total of 25 squares will be needed. **(2 marks)**

b.



This shape has 25 squares. **(2 marks)**

c. Find the pattern.

1,	4,	9,	16,	25,...,	n
↑	↑	↑	↑	↑	↑
1^2	2^2	3^2	4^2	5^2	n^2

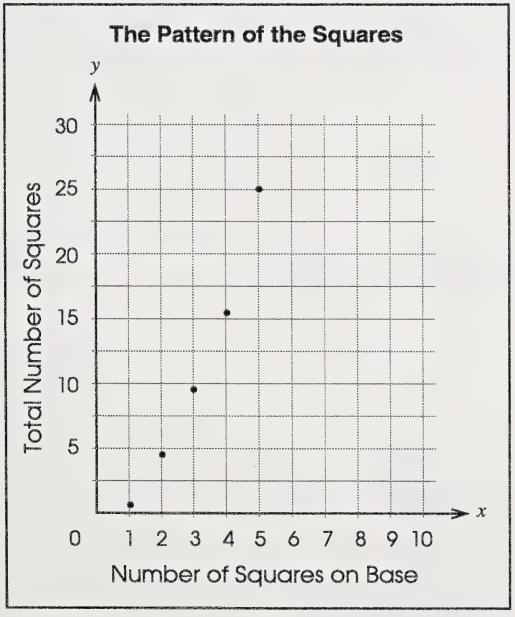
So, n^2 squares will be needed. **(2 marks)**

d. If $n = 10$, then

$$n^2$$
$$= 10^2$$
$$= 100$$

So, 100 squares will be needed. **(2 marks)**

e.



Note: The dots are not connected because there cannot be parts of squarein the shapes.

Students may choose a different scale for their graph. **(2 marks)**

2. **a.** If Daniel's age is d, then his mother's age can be expressed as $2d+10$. **(2 marks)**

b. If $d=12$, then

$$\begin{aligned} &2d+10 \\ &=2\times12+10 \\ &=24+10 \\ &=34 \end{aligned}$$

If Daniel's age is 12 years, his mother's age is 34 years. **(2 marks)**

3. $A=\ell w$

$$\begin{aligned} &=21.4\times9.6 \\ &=205.44 \\ &\doteq205 \end{aligned}$$

The area of the cheque was about 205 m^2. **(2 marks)**

4. **a.**

$$\begin{array}{rl} x+3= & -1 \\ -3 & -3 \\ \hline x & =-4 \end{array}$$

or

$$\begin{aligned} x+3&=-1 \\ x+(+3)&=-1 \\ x+(+3)+(-3)&=(-1)+(-3) \\ x&=-4 \end{aligned}$$

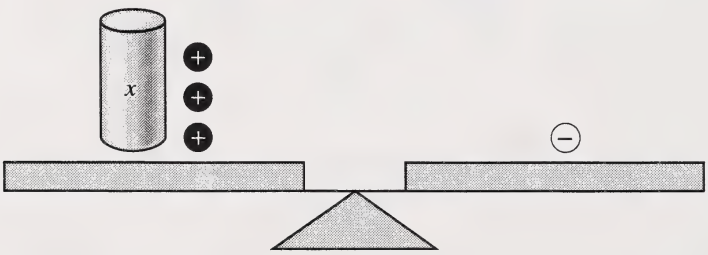
(2 marks)

b.

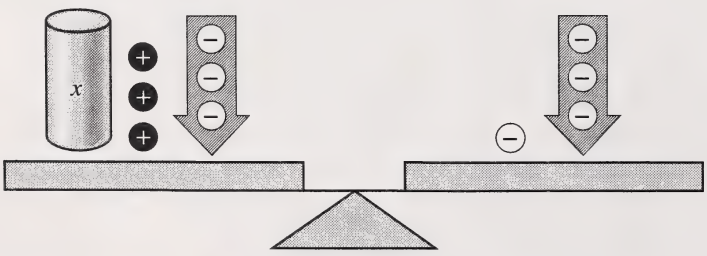
LS	RS
$x+3$	-1
$=-4+3$	
$=(-4)+(+3)$	
$=-1$	

LS = RS **(2 marks)**

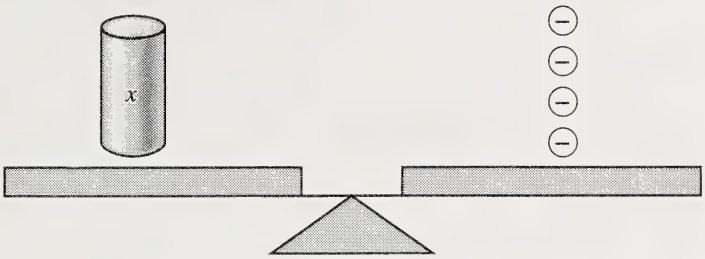
5. The equation $x+3=-1$ can be modelled like this.



To solve the equation, add three negative counters to each side.



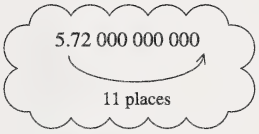
Remove the zero pairs.



So, $x = -4$. **(2 marks)**

Part 3: Shape and Space (23 marks)

1. a. $5.72 \times 10^{11} = 572\,000\,000\,000$



So, the national debt was about \$572 000 000 000. **(2 marks)**

b. $5\,910\,000\,000 = 5.91 \times 10^{9}$

Pluto is about 5.91×10^{9} km from the Sun. **(2 marks)**

2. **Note:** Students may recall that the time in Winnipeg is 2 h more than the time in Vancouver, or students may use the corresponding integers on the map to calculate the change of time from Vancouver to Winnipeg. (The corresponding integer for Vancouver is -8. The corresponding integer for Winnipeg is -6.)

$$\begin{aligned}(-6)-(-8) &= (-6)+(+8)\\ &= +2\end{aligned}$$

$\therefore$ 08:25 PST = 10:25 CST

Subtract the departure time (CST) from the arrival time (CST).

$$\begin{array}{r} 13:40 \\ -\ 10:25 \\ \hline 3:15 \end{array}$$

The flight took 3 h and 15 minutes. **(4 marks)**

3. a. Students may use the corresponding integers on the map to calculate the change in time from Calgary to Japan. (The corresponding integer for Japan is $+9$. The corresponding integer for Calgary is -7.)

$$\begin{aligned}(+9)-(-7) &= (+9)+(+7)\\ &= 16\end{aligned}$$

The time in Japan is 16 h more than the time in Calgary. **(3 marks)**

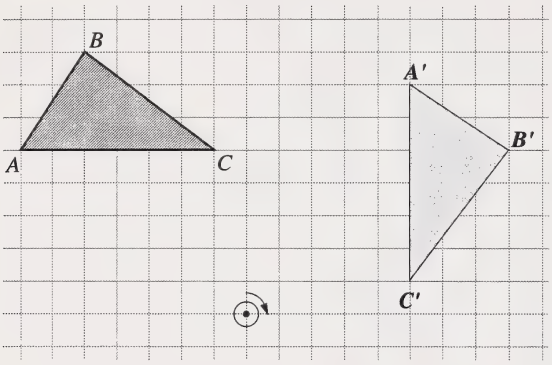
b.
$$\begin{array}{r} 07:00 \\ +\ 16 \\ \hline 23:00 \end{array}$$

When it is 07:00 MST in Calgary, it is 23:00 in Japan. **(2 marks)**

4. a. $\angle 5$ and $\angle 2$ are **vertically opposite** angles. **(1 mark)**
b. $\angle 1$ and $\angle 2$ are both **complementary** angles and **adjacent** angles. **(2 marks)**

5. a. $\angle 2$ and $\angle 6$ are **corresponding** angles. **(1 mark)**
b. $\angle 2$ and $\angle 4$ are **vertically opposite** angles. **(1 mark)**
c. $\angle 2$ and $\angle 1$ are **adjacent** angles or **supplementary** angles. **(1 mark)**
d. $\angle 2$ and $\angle 3$ are **supplementary** angles or **adjacent** angles. **(1 mark)**

6.



(3 marks)

Part 4: Probability and Statistics (22 marks)

1. a. $\dfrac{31+29+31+30+31+30+31+31+30+31+30+31}{12} = 30.5$

The mean is 30.5 days. **(2 marks)**

b.

29	30	30	30	30	31
31	31	31	31	31	31

The median is between 31 and 31.

$$\frac{31+31}{2} = \frac{62}{2}$$
$$= 31$$

The median is 31 days. **(2 marks)**

c. The mode is 31 days because the majority of months have 31 days. **(2 marks)**

d. The upper extreme is 31. The lower extreme is 29.

$$31 - 29 = 2$$

The range is 2 days. **(2 marks)**

e.

29	30	30	30	30	31
31	31	31	31	31	31

The lower quartile is between 30 and 30.

$$\frac{30+30}{2} = \frac{60}{2}$$
$$= 30$$

The lower quartile is 30 days. **(2 marks)**

f.

29	30	30	30	30	31
31	31	31	31	31	31

The upper quartile is between 31 and 31.

$$\frac{31+31}{2} = \frac{62}{2}$$
$$= 31$$

The upper quartile is 31 days. **(2 marks)**

2. a. This is the set of possible outcomes:

$$\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$$ **(2 marks)**

b. In question 2.a., 12 possible outcomes were listed. Of these, only 1 is favourable.

This is the set of favourable outcomes:

$$\{5\}$$

$$P(5) = \frac{1}{12}$$

$$\frac{\text{Number of Favourable Outcomes}}{\text{Number of Possible Outcomes}}$$

So, the probability of tossing a 5 is $\frac{1}{12}$. **(2 marks)**

3. a.

	1	2	3	4	5	6
1	(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)
2	(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)
3	(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)
4	(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)
5	(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)
6	(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6)

This is the set of possible outcomes:

$\{(1,1), (1,2), (1,3), (1,4), (1,5), (1,6), (2,1), (2,2), (2,3), (2,4), (2,5), (2,6), (3,1), (3,2), (3,3), (3,4), (3,5), (3,6), (4,1), (4,2), (4,3), (4,4), (4,5), (4,6), (5,1), (5,2), (5,3), (5,4), (5,5), (5,6), (6,1), (6,2), (6,3), (6,4), (6,5), (6,6)\}$ **(4 marks)**

b. In question 3.a., 36 possible outcomes were listed. Of these, only 4 are favourable.

This is the set of favourable outcomes:

$\{(1,4), (2,3), (3,2), (4,1)\}$

$$P(\textit{sum of } 5) = \frac{4}{36}$$
$$= \frac{1}{9}$$

$$\frac{\text{Number of Favourable Outcomes}}{\text{Number of Possible Outcomes}}$$

So, the probability of tossing a sum of 5 is $\frac{1}{9}$. **(2 marks)**

MATHEMATICS 7

FINAL TEST

GENERAL INSTRUCTIONS

YOU HAVE **TWO** HOURS TO COMPLETE THIS TEST. Work through the entire test answering the questions you are sure you know. You will then be able to concentrate on the questions of which you are not quite sure.

TOTAL MARKS: 100

PART 1: Number	33 marks
PART 2: Patterns and Relations	22 marks
PART 3: Shape and Space	23 marks
PART 4: Probability and Statistics	22 marks

Note: You will need a scientific calculator and a mathematical instrument set.

Value

PART 1: NUMBER

33 **Answer each of the following questions using the space provided. Clearly show how you arrived at your answers.**

(1 mark) **1.** There are four people on a curling team. If 380 curlers signed up for a tournament and teams were made up, would there be any curlers left over? Use a divisibility test to solve this problem.

(2 marks) **2.** A bag of candies can be divided equally (with no candies left over) among 2, 3, 4, 5 or 6 friends. What is the least number of candies there could be in the bag?

Name of Student _____	Student I.D. # _____
Name of School _____	Date _____

(2 marks) **3.** A stack of 1000 sheets of paper is 8 cm thick. What is the thickness of a stack of 250 sheets of paper?

(2 marks) **4.** A ball driven by a professional golfer travelled a distance of 238 m in 6 s. What was the distance the ball travelled in 1 s?

(2 marks) **5.** Brenda uses a calculator to express each of the following fractions as decimal numbers.

$$\frac{1}{9} = 0.\bar{1}$$

$$\frac{2}{9} = 0.\bar{2}$$

$$\frac{3}{9} = 0.\bar{3}$$

Predict what fraction will have $0.\bar{8}$ as a decimal number.

_____

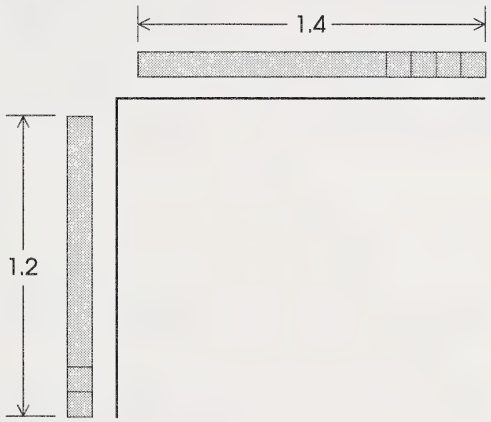
_____

Name of Student _____ Student I.D. # _____

Name of School _____ Date _____

6. Some students can multiply whole numbers but not decimal numbers.

(3 marks) **a.** To help these students, complete this diagram showing how base ten blocks can be used to model 1.2×1.4 and find the product.



(2 marks) **b.** Show the paper-and-pencil method.

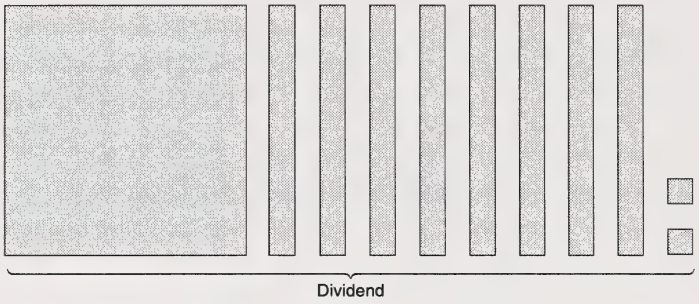
$$\begin{array}{r} 1.2 \\ \times\ 1.4 \\ \hline \end{array}$$

Name of Student _____	Student I.D. # _____
Name of School _____	Date _____

7. Some students can divide whole numbers but not decimal numbers.

(3 marks)

a. To help these students, complete this diagram. Show how base ten blocks can be used to model $1.82 \div 1.4$ and find the quotient.



(2 marks)

b. Show the paper-and-pencil method.

$1.4\overline{)1.82}$

Name of Student _____	Student I.D. # _____
Name of School _____	Date _____

(3 marks) **8.** Draw a diagram to show how two-coloured counters **or** a number line can be used to model $(+3)+(-5)$ and find the sum.

(3 marks) **9.** As late as the eighteenth century, the authors of some mathematics textbooks stated that the multiplication of a negative number by a negative number was impossible.

Draw a diagram to show how you can model the expression $(-2)\times(-4)$ and find the product. **Hint:** You may choose to show either counters **or** a number line. If you use a number line, you do not need to draw Droopy. Simply indicate which Droopy learning aid is needed and show the steps Droopy makes on the number line.

Name of Student _____	Student I.D. # _____
Name of School _____	Date _____

10. Of the cars produced for private use, the largest was the Bugatti Royale which was built in France by Italian Ettore Bugatti (1882–1947). This car was 6.7 m long from bumper to bumper. If the diameter of a quarter is 0.021 m, how many quarters placed end to end would stretch the length of this car?

(2 marks) **a.** Explain how you estimated the answer.

(2 marks) **b.** Explain how you used a calculator to compute the answer.

11. On a recent day, the temperature on the Moon reached 117°C at noon and dropped 280° by nightfall. What was the temperature on the Moon at nightfall?

(2 marks) **a.** Explain how you estimated the answer.

Name of Student _____	Student I.D. # _____
Name of School _____	Date _____

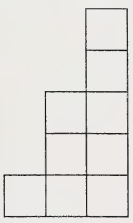
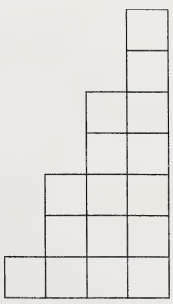
(2 marks) **b.** Use a calculator to compute the answer. (Give the key sequence.)

Value

PART 2: PATTERNS AND RELATIONS

22 **Answer each of the following questions using the space provided. Clearly show how you arrived at your answers.**

Use the following chart to answer question 11.

Shape	Number of Squares on the Base	Total Number of Squares
	1	1
	2	4
	3	9
	4	16

Name of Student _____ Student I.D. # _____

Name of School _____ Date _____

(2 marks) **1. a.** If the pattern continues, predict how many squares will be needed to build a shape with five squares on the base.

(2 marks) **b.** Check your prediction in question 1.a. by drawing a diagram.

(2 marks) **c.** If the pattern continues, how many squares will be needed to build a shape with n squares on the base?

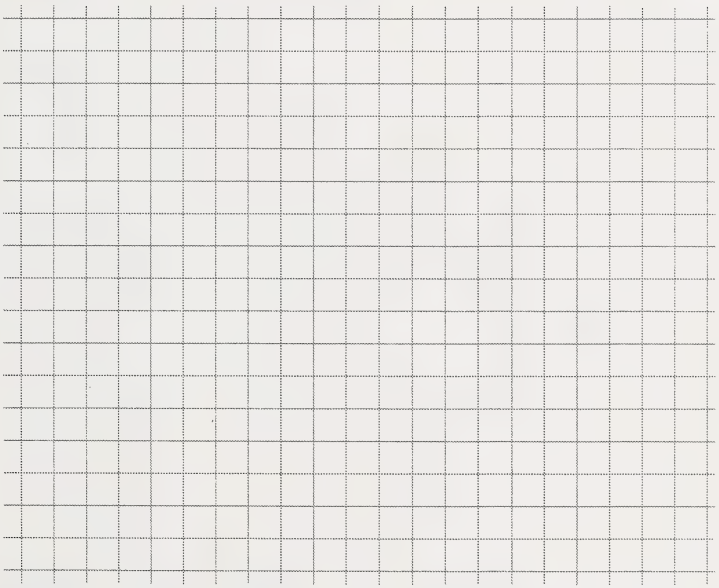
Name of Student _____	Student I.D. # _____
Name of School _____	Date _____

(2 marks)

d. If the pattern continues, how many squares will be needed to build a shape with 10 squares on the base?

(2 marks)

e. On a graph, show the relationship between the number of squares on the base and the total number of squares.



Name of Student _____	Student I.D. # _____
Name of School _____	Date _____

2. Daniel's mother is 10 years more than twice Daniel's age.

(2 marks) **a.** Write an algebraic expression for his mother's age. **Hint:** Let Daniel's age be d.

(2 marks) **b.** If Daniel's age is 12, how old is his mother?

(2 marks) **3.** The world's physically largest cheque measured 21.4 m by 9.6 m. What was the area of the cheque? Express the answer to the nearest m^2. **Hint:** The formula for finding the area of a rectangle is $A = \ell w$.

(2 marks) **4. a.** Solve the equation $x + 3 = -1$ by using a systematic method. Do **not** use the guess, check, and revise method. Show your work.

Name of Student _____	Student I.D. # _____
Name of School _____	Date _____

(2 marks) **b.** Verify the solution to question 4.a.

(2 marks) **5.** Make diagrams showing how a model can be used to solve the equation $x+3=-1$.

Name of Student _____	Student I.D. # _____
Name of School _____	Date _____

Value

PART 3: SHAPE AND SPACE

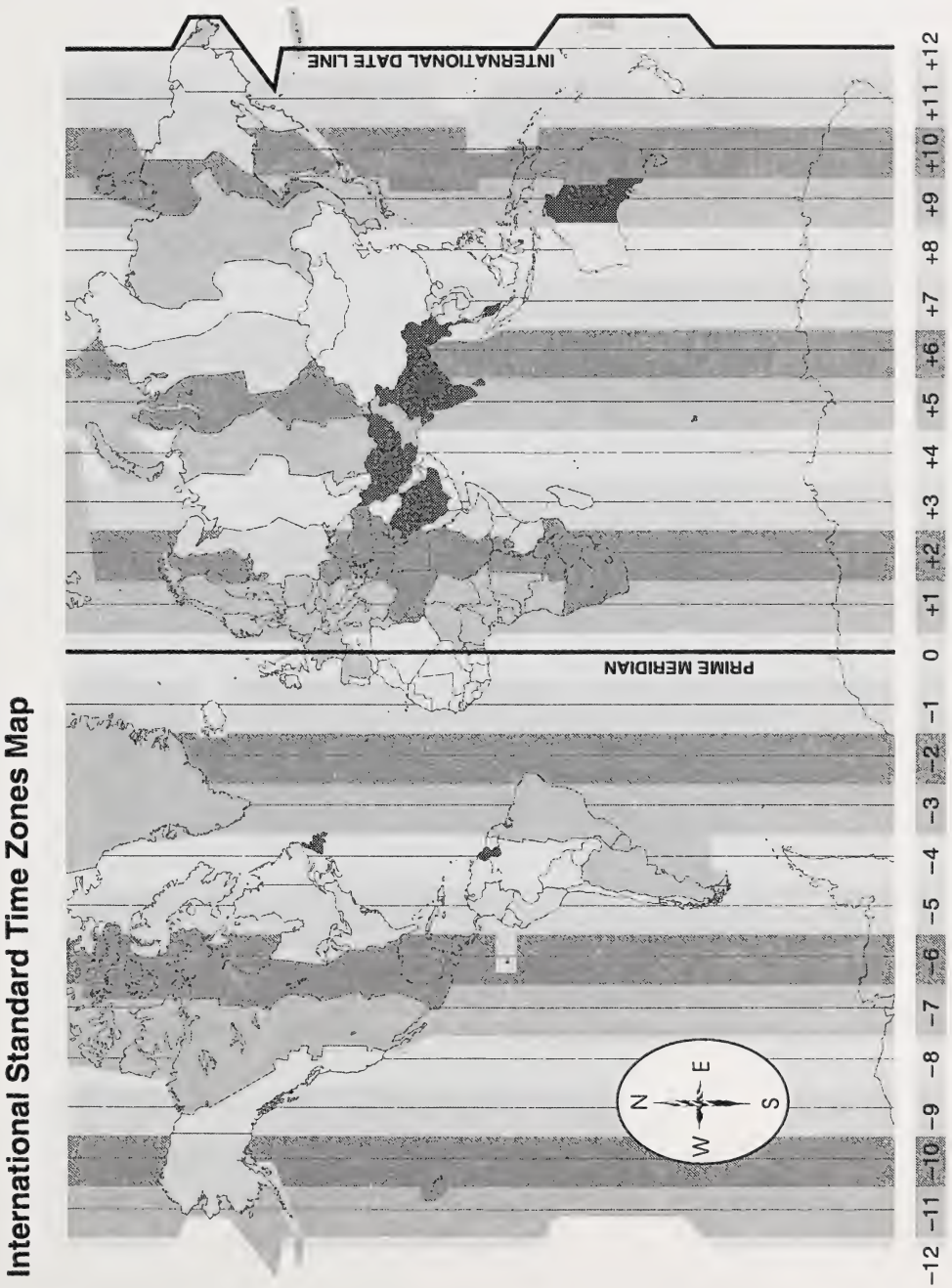
23 **Answer each of the following questions using the space provided. Clearly show how you arrived at your answers.**

(2 marks) **1. a.** The national debt in Canada in January 1996 was about 5.72×10^{11} dollars. Express this amount in standard form.

(2 marks) **b.** Pluto is about 5 910 000 000 km from the Sun. Write this distance in scientific notation.

Name of Student _____	Student I.D. # _____
Name of School _____	Date _____

Use the "International Standard Time Zones" map to answer questions 2 and 3.


International Standard Time Zones Map
INTERNATIONAL DATE LINE
PRIME MERIDIAN
N
E
S
W
−12 −11 −10 −9 −8 −7 −6 −5 −4 −3 −2 −1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +10 +11 +12

(4 marks) **2.** If you left Vancouver at 08:25 PST and arrived in Winnipeg at 13:40 CST, how long was your flight?

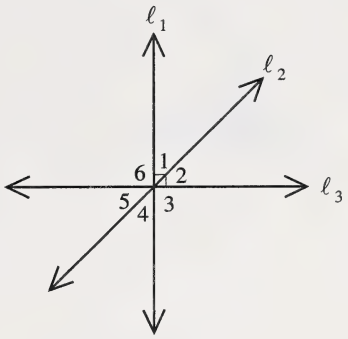
(3 marks) **3. a.** What is the change in time from Calgary to Japan?

(2 marks) **b.** If a person living in Calgary calls a friend in Japan at 07:00 MST, what time is it in Japan?

Name of Student _____ Student I.D. # _____

Name of School _____ Date _____

Use the following diagram to answer question 4.

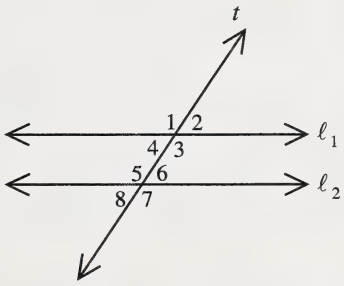


(1 mark) **4. a.** $\angle 5$ and $\angle 2$ are _____ angles.

(2 marks) **b.** $\angle 1$ and $\angle 2$ are both _____ angles and

_____ angles.

Use the following diagram to answer question 5.



(1 mark) **5. a.** $\angle 2$ and $\angle 6$ are _____ angles.

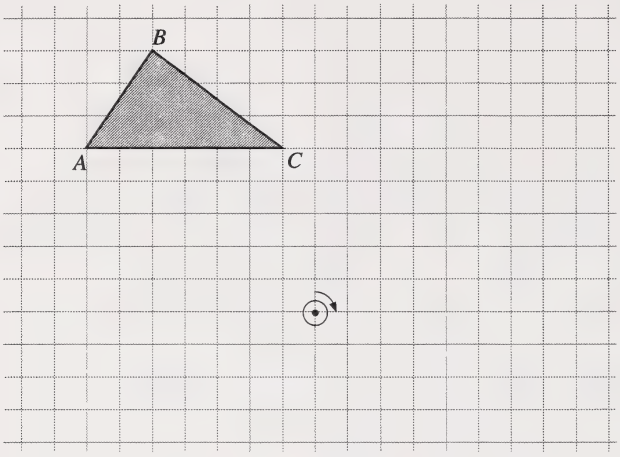
(1 mark) **b.** $\angle 2$ and $\angle 4$ are _____ angles.

(1 mark) **c.** $\angle 2$ and $\angle 1$ are _____ angles.

(1 mark) **d.** $\angle 2$ and $\angle 3$ are _____ angles.

Name of Student _____	Student I.D. # _____
Name of School _____	Date _____

(3 marks) **6.** Draw and label the turn image of the following figure for the given turn centre and arrow.



Value

PART 4: STATISTICS AND PROBABILITY

22 **Answer each of the following questions using the space provided. Clearly show how you arrived at your answers.**

1. This is a list of the number of days for each month during a leap year.

31	29	31	30	31	30
31	31	30	31	30	31

(2 marks) **a.** Give the mean number of days each month.

Name of Student _____ Student I.D. # _____

Name of School _____ Date _____

(2 marks) **b.** Give the median number of days each month.

(2 marks) **c.** Give the mode(s) of the number of days each month.

_____

_____

_____

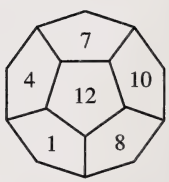
(2 marks) **d.** Give the range.

Name of Student _____	Student I.D. # _____
Name of School _____	Date _____

(2 marks) **e.** Give the lower quartile.

(2 marks) **f.** Give the upper quartile.

(2 marks) **2. a.** A special die has 12 faces labelled 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12. If you toss the die, what are the possible outcomes?

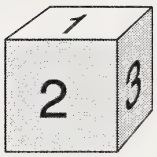


Name of Student _____ Student I.D. # _____

Name of School _____ Date _____

(2 marks) **b.** What is the probability of tossing a 5 with the special die?

(4 marks) **3. a.** A standard die has six faces labelled 1, 2, 3, 4, 5, and 6. If you toss two standard dice, what are the possible outcomes?



Name of Student _____ Student I.D. # _____

Name of School _____ Date _____

(2 marks) **b.** What is the probability of tossing a sum of 5 with two standard dice?

Name of Student _____	Student I.D. # _____
Name of School _____	Date _____

TEACHER QUESTIONNAIRE FOR MATHEMATICS 7 (1996)

This is a course designed in a new distance-learning format, so we are interested in your responses. Your constructive comments will be greatly appreciated so that a future revision may incorporate any necessary improvements.

Teacher's Name _____ Area of Expertise _____

School Name _____ Date _____

Design

1. The modules follow a definite systematic design. Did you find it easy to follow?

   ❑ Yes ❑ No If no, explain.

   _____

   _____

2. Did your observations reveal that the students found the design easy to follow?

   ❑ Yes ❑ No If no, explain.

   _____

   _____

3. Did you find the Learning Facilitator's Manual helpful?

   ❑ Yes ❑ No If no, explain.

   _____

   _____

4. Part of the design involves stating the objectives in student terms. Do you feel this helped the students understand what they were going to learn?

   ❑ Yes ❑ No If no, explain.

   _____

   _____

5. The Learning Facilitator's Manual contains Assignment answers and a sample test. Did you find these helpful?

❑ Yes ❑ No If no, explain.

_____

_____

6. Did the Follow-up Activities prove to be helpful?

❑ Yes ❑ No If no, explain.

_____

_____

7. Were students motivated to try these Follow-up Activities?

❑ Yes ❑ No If no, give details.

_____

_____

8. Suggestions for computer and video activities are included in the course. Were your students able to use these activities?

❑ Yes ❑ No Comment on the lines below.

_____

_____

9. Were the assignments appropriate?

❑ Yes ❑ No If no, give details.

_____

_____

10. Did you fax assignments? ❑ Yes ❑ No

11. If you did fax, did you get satisfactory results from using this procedure?

❑ Yes ❑ No If no, give details.

_____

_____

Instruction

1. Did you find the instruction clear?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

2. Did your observations reveal that the students found the instruction interesting?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

3. Did you find the instruction adequate?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

4. Was the reading level appropriate?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

5. Was the work load adequate?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

6. Was the content accurate and current?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

7. Did the content flow consistently and logically?

❑ Yes ❑ No If no, give details.

_____

_____

8. Was the transition between booklets smooth?

❑ Yes ❑ No If no, give details.

_____

_____

9. Was the transition between print and media smooth?

❑ Yes ❑ No If no, give details.

_____

_____

Additional Comments

_____

_____

_____

_____

_____

_____

_____

_____

Thanks for taking the time to complete this survey. Your feedback is important to us.

Fax Number: 674-6686

Instructional Design and Development Unit
Alberta Distance Learning Centre
Box 4000
Barrhead, Alberta
T7N 1P4

Note: Please ensure that each of your students has completed and forwarded a copy of the Course Survey.

National Library of Canada
Bibliothèque nationale du Canada
3 3286 50917 7180

Mathematics 7
Learning Facilitator's Manual
LRDC
Producer
1996